1995 ANNUAL REPORT OF THE TUMOR REGISTRY

KING FAISAL SPECIALIST HOSPITAL & RESEARCH CENTRE
RIYADH, KINGDOM OF SAUDI ARABIA

ACKNOWLEDGEMENTS:

The Cancer Program is a combined effort of many individuals. It is not possible to enumerate all the nurses, technicians, therapists, pharmacists, dentists, physicians, scientists, social workers and others whose work is primarily on behalf of the patient with cancer. In addition, nearly everyone associated with the hospital comes in contact with the cancer patient from time to time, frequently contributing significantly to their care. The staff of the Tumor Registry and members of the Tumor Committee recognize this hospital-wide involvement in the care of cancer patients. The information in this report is provided to assist all health care professionals to better understand the problems faced in treating patients with cancer.

The following Departments have assisted throughout the year and without their invaluable support this report would not be possible. The Tumor Registry staff acknowledges these Departments:

Department of Pathology & Laboratory Medicine
Computer and Hospital Information Centre
Medical Records Services
Department of Oncology
Home Health Care

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1995 ANNUAL REPORT OF THE TUMOR REGISTRY

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TUMOR REGISTRY

History

The King Faisal Specialist Hospital and Research Centre (KFSH&RC) opened in June 1975 to provide specialized medical treatment to the people of Saudi Arabia and to promote the prevention of disease through research and education. It is a national and international tertiary care hospital for Oncology and the principal center for cancer therapy in Saudi Arabia.

The KFSH&RC Tumor Registry is a hospital-wide data system designed for the collection, management, and analysis of data on patients with the diagnosis of a malignant neoplasm (cancer). The Registry was established to meet one of the requirements for an Approved Cancer Program of the American College of Surgeons (ACoS) and is under the supervision of the Tumor Committee. The database now includes 30,700 malignant cases seen at KFSH&RC from June 1975 through December 31, 1995. More than 2,000 new cases are added annually.

The Registry is staffed primarily with certified tumor registrars who support the database in case ascertainment, abstracting, follow up and statistical analyses. The basic source document is the patient's medical record from which pertinent information is abstracted for use in the Registry. The electronic data system used is the Cansur 3.0 designed by the ACoS in which the details of each diagnosed cancer case is entered and stored. (Please refer to Figures 1-A to 1-D for a sample data set.)

Data Use

The data maintained in the Tumor Registry provides the statistics for the publication of the KFSH&RC annual report which summarizes the hospital's cancer experience. The data also supports a wide variety of reports at the request of physicians, researchers, and ancillary personnel. These reports support patient management and outcome, basic and clinical research investigations, educational publications and presentations, and resource utilization. In 1995, the Tumor Registry supported 62 data requests (see Appendix A for a listing of requests for Tumor Registry data).

Procedural and Administrative Activities During 1995

In January 1995, the Tumor Registry was amalgamated with the Department of Oncology Clinical Research Unit, the Bone Marrow Transplantation Offices, and the KFSH&RC branch of the National Cancer Registry (NCR) into one unit named "Oncology Data Unit" which is headed by a Medical Director.

With the opening of the National Cancer Registry, the Tumor Registry was required to report cases seen at KFSH&RC who were diagnosed on or after 01 January 1994. More than 2,100 cases seen in 1994 have been identified and reported to the NCR.

As part of an ongoing project, the staff reviewed and reabstracted death and inactive charts before microfiching by the Medical Records Department. Reabstracting of cases is necessary because these are cases seen prior to 1990 which were entered into the registry database using the old system with very minimal information not compatible with the present system.

Chordoma had been coded initially to the soft tissue as the primary site of origin. The primary site had been changed to the bone based on recent resources and references.

Staffing continued to be a problem, there were only two registrars from October 1994 to October 1995, thereby resulting in the inability to perform other tasks such as the checking of the daily Oncology clinic outpatient schedules to

identify new cancer cases which are not in the registry database. Although a new certified tumor registrar joined the registry in mid October 1995, there was still another position which had remained vacant until late March 1996.

The Cansurfacs (the new system designed by the ACoS) has been purchased by the hospital, but has not been installed for use by the registry. It is still being tested and modified to meet the requirements of the KFSH&RC as well as the NCR. The registry hopes to be able to use it in 1997.

All personnel of the Tumor Registry have attended external and internal educational programs that serve as continuing education of the staff.

TUMOR COMMITTEE

The multidisciplinary Tumor Committee, which meets bimonthly, is the policy-making body of the Cancer Program at KFSH&RC (see Appendix B for membership listing). During 1995, the Committee provided professional and administrative guidance to the Tumor Registry and its most prominent achievements include the following:

Expanded the membership of the Committee by adding representatives from the Departments of Radiology, Media Affairs and Nursing.

Continued with the process of adapting special forms for cancer staging to be part of the patients' medical records. The most recent staging software was obtained from the American College of Surgeons, with 13 major cancer sites, and it is presently being evaluated by the Computer and Hospital Information Centre (CHIC) for possible incorporation into the Pathology computerized system.

Approved the concept of establishing multidisciplinary combined clinics for the most important tumor sites.

Succeeded in preparing individual chemotherapy drug handouts for patients receiving chemotherapy. These have been distributed in the outpatient clinics as well as inpatient units. Each sheet describes a single chemotherapy agent. Two brochures, one on breast cancer and the other on ovarian cancer, were published and distributed to new patients with the disease. The goal is to produce a brochure on each cancer site, totaling around 28 sites. Presently, the main obstacle is funding for the publication of these brochures, but the Committee will continue to work hard on this issue.

Revised the objectives of the Tumor Committee to include the following:

Organize, publicize, conduct and evaluate the educational and consultative cancer conferences that are multidisciplinary, institution-wide and patient-oriented.

Make certain that consultative services from all major disciplines are available to all patients.

Plan and complete a minimum of two patient care evaluation studies annually, one to include survival data, and if available, comparison data.

Make certain that cancer rehabilitation services are available and used.

Encourage a supportive care system for all patients with cancer.

The Tumor Committee feels that these objectives should be closely followed as much as possible and be evaluated on an annual basis.

Revised the functions of the Tumor Committee in relation to the Tumor Registry as follows:

Determine which cancer prevention programs are needed.

Ascertain if there is a need, based on a comparison of the institution's data with national or regional data, for public and professional educational programs about early diagnosis of specific malignancies.

Make certain that pre-treatment work-up and staging are comparable to or exceed national or regional data.

Review types of treatment to determine the need for, or the impact of, specific professional educational programs.

Analyze patient survival by stage of disease and treatment as compared with national or regional data.

Document patterns of recurrence of specific malignancies and the occurrence of multiple primary malignancies.

Encourage systematic lifelong surveillance of all patients with cancer.

Encourage studies by clinicians, administrators and other health care professionals.

TUMOR BOARD

This educational conference is held as frequently as twice a month for the benefit of the attending staff, house staff, allied health professionals and visiting attending staff from other hospitals. Cases of various types of malignant disease are selected for presentation on the basis of complexity, unusual manifestations of the disease, or interest. Each presentation includes an outline of the medical history, physical findings, clinical course, radiographic studies, and pathological interpretations. Following each presentation, there is an informal discussion of the case and a review of pertinent medical literature. Those attending are encouraged to share personal experience in the management of similar cases. Please refer to Appendix C for a summary of cases presented in 1995.

ONCOLOGY GRAND ROUNDS

This didactic conference is held every other week and is attended by the Medical staff and allied health professionals. Speakers are drawn from the KFSH&RC Medical and Research staff as well as from visiting guests. Please refer to Appendix D for a listing of the topics presented at the Oncology Grand Rounds in 1995.

FIGURE 1-A

PATIENT NAMEPLATE

KING FAISAL SPECIALIST HOSPITAL AND RESEARCH CENTRE

CANCER REGISTRY WORKSHEET
(CanSur 3.0)

PF 10 TACS – ACCESSION FILE MAINTENANCE

ACCESSION NUMBER (ACSN) : 8 7 0 1 2 3

TUMOR SEQUENCE (SEQ) : 0 0

Malignant/In situ tumors	Benign tumors
00 - One primary only	XX – One primary only
01 - First of two or more	AA – First of two or more
....	....
98 - 98th or later primary	BB - 8th or later primary
99 - Unspecified sequence	ff - Unspecified sequence

THIS CANCER ACCESSION YEAR : 8 7

MEDICAL RECORD NO. : 3 9 4 6 5 7

CASE STATUS : 3

0 – Suspense
1 – Incomplete
3 – Completed per Release 3

PATIENT NAME

Last : _____

First : _____

Second : _____

Third : _____

ADDRESS AT DIAGNOSIS

P.O. Box _____

Riyadh
City

R Y
Prov.

Zip Code : _ _ _ _ _ - _ _ _ _

PF 11 TPAT – PATIENT IDENTIFICATION

SAUDI ID : 1 2 3 4 5 _ _ _ _

BIRTHDATE : 0 1 / 0 1 / 1 9 4 6

AGE AT DX : 0 4 1

SEX : 2

1 – Male (2) Female 9 – Unknown

NATIONALITY : 0 0

(0) Saudi
01 – Amer, Can, Brit
02 – Egyptian
03 – Leb, Syr, Pal
04 – Yemeni
05 – Other Arab
06 – Ind, Pak
07 – African
09 – Other

MARITAL STATUS AT DX : 2

1 – Single
(2) Married
3 – Separated
4 – Divorced
5 – Widowed
9 – Unknown

RELIGION : 0 1

(01) Muslim
02 – Christian
03 – Hindu
04 – Buddhist
06 – Other
99 – Unknown

ALCOHOL USAGE : 3

1 – Current alcohol usage
2 – Past history of alcohol usage
(3) – Never used alcohol
9 – Unknown

FAMILY HISTORY OF CANCER : 1

(1) Family history of cancer
2 – No family history of cancer
9 – Unknown

SMOKING/CHEWING HISTORY 3

1 – Current smoker cig.
2 – Past smoker
(3) Patient never smoked
4 – Ghat
5 – Shamma
6 – Shisha
7 – Combo
8 – Other
9 – Unknown

TOTAL PACK YEARS :

INDUSTRY : _____

OCCUPATION : Teacher

DATE ADMITTED : (mm/dd/yyyy) 0 1 / 2 0 / 1 9 8 7

DATE DISCHARGED : (mm/dd/yyyy) 0 2 / 1 5 / 1 9 8 7

REPORTING SOURCE : 1

(1) Inpatient
2 – Clinic/outpatient
3 – Laboratory
4 – Physician's office
5 – Nursing home
6 – Autopsy
7 – Death Cert
9 – Unknown

HOSPITAL REFERRED FROM : 0 0 0 0 1 0 1

Riyadh Central Hospital

HOSPITAL REFERRED TO _____

Form 350-11 (Rev. 9-10)

FIGURE 1-B

PF 12 TTXT – MISCELLANEOUS TEXT

PHYSICAL EXAM: 6-mo hx 2 cm mass rt breast UOQ, mobile, no skin changes. 3x4 cm rt axillary LN. Lt breast NED.

X RAYS / SCANS: 01/20/87 Bilat Mammogram - 2x2.5x2.5 cm mass rt breast UOQ. CXR, Bone Scan, U/S Abdomen - NED

SCOPES / LAB: 01/25/87 ERA (+), PRA (+)

OPERATIVE FINDINGS: 01/25/87 Rt Mod Rad Mastectomy - no description of tumor.

PATHOLOGY / AUTOPSY: 87SP3286 01/25/87 Duct Cell Ca, gr 3; 11/19 LN's. (tumor size: 2.2x2x1.8 cm completely excised) Nipple & overlying skin NED. (largest LN 1.5 cm)

PF 13 TCAN – CANCER IDENTIFICATION

DATE OF INITIAL DIAGNOSIS: (mm/dd/yyyy) 01/25/87

CLASS OF CASE: 1

0 Dx here, tx elsewhere
(1) Dx & tx here
2 Rx here
3 Rx elsewhere
4 Rx here prior
5 Dx at autopsy
9 Unknown

PRIMARY SITE – TEXT: Breast, Right UOQ

CODE: 174 1

HISTOLOGY – TEXT: Duct Cell Carcinoma, gr 3

CODE: 8500/3

TCAN – Cancer Identification (Continued)

GRADE: 3

1 – Well differentiated (I)
2 – Mod well differentiated (II)
(3) Poorly differentiated (III)
4 – Undifferentiated (IV)
5 – T-cell
6 – B cell
7 Null cell
9 Not stated, unknown

LATERALITY: 1

0 – Not paired organ
(1) Right
2 – Left
3 – Rt or lt unspecified
4 Both, simultaneous
9 Unknown laterality

DX CONFIRMATION: 1

(1) Positive histology
2 – Cytology
4 – Pos. micro, confirm, NOS
5 – Laboratory test/marker
6 – Direct visualization
7 – Radiography
8 – Clinical
9 – Unknown

REGIONAL NODES EXAMINED: 19

00 – No nodes examined
01 – One node examined
....
97 – 97 + nodes examined
98 – Nodes examined, number unknown
99 – Unknown if nodes examined

REGIONAL NODES POSITIVE: 11

00 – No nodes positive
01 – One node positive
...
98 – 96 + nodes positive
97 – Positive nodes, number unknown
98 – No nodes examined
99 – Unknown if any nodes +/-

TUMOR SIZE (cm) 022

eg., 000 – No mass, 002 – 0.2 cm, 055 – 5.5 cm, 999 – Unknown

RESIDUAL TUMOR: 0

(0) None
1 – Microscopic
2 – Macroscopic
8 – No resection, NA
9 – Unknown

DISTANT METS: 1: 2: 3:

0 – Bone Mar.
1 – Peritoneum
2 – Lung
3 – Pleura
4 – Liver
5 – Bone
6 – CNS
7 – Skin
8 Lymph node (distant)
9 – Unknown/other

GENERAL SUMMARY STAGE: 3

0 – In situ
1 – Localized
2 – Regional, direct extension
(3) Regional, nodes
4 – Regional, both 2 & 3
5 – Regional, NOS
7 – Distant
9 – Unknown/unstageable

AJCC STAGE:

CLINICAL T 2 • N 1 • M 0 • STAGE GROUP 2 B**

PATHOLOGICAL T 2 • N 1 B • M 0 • STAGE GROUP 2 B**

OTHER*** T • N • M • STAGE GROUP **

*TNM Codes – (use alpha codes as appropriate; eg. 12A 2A, 12 2, N1B - 1B, M0 - 0, IS - In situ, X Unknown)

**AJCC Stage Group – use alpha codes as appropriate; eg. 3A Stage IIIA, 1 Stage I

0 – In situ
1 – Stage I
2 Stage II
3 – Stage III
4 – Stage IV
9 – Unknown

***Other Basis: (S Surgical), A Autopsy, D Determinant

FIGURE 1-C

PF 14 TRX1 – 1ST COURSE TREATMENT (SURGERY, RADIATION)

SURGERY

REASON : |0|

(0) Can directed surg performed
1 Not recommended
2 Contraindicated, other
6 Reason unknown, no surg
7 Patient/guardian refused
8 Recommended, unk if done
9 unknown

SUMMARY : (Entire 1st course)* |5|0|

AT THIS HOSPITAL : * |5|0|

* Refer to Appendix A in CanSur User Manual for site specific codes.

STARTED : (mm/dd/yyyy) |0|1| /|2|5| /|1|9|8|7|

TEXT : Rt Mod Rad Mastectomy w/ Rt Axillary Dissection

RADIATION

SUMMARY :

AT THIS HOSPITAL |1|

0 No Radiation therapy
(1) Beam radiation
2 Radioactive implants
3 Radioisotopes
4 Comb 1 + 2 or 3
5 Radiation therapy, NOS
7 Patient/guardian refused
8 Recommended, unk if done
9 Unknown

|1|

STARTED : (mm/dd/yyyy) |0|8| /|2|9| /|1|9|8|7|

TO BRAIN & CNS : (Lung & leukemia cases only) |9|

0 None to CNS
1 Radiation therapy
7 Patient/guardian refused
8 Recommended, unk if done
(9) Unknown; not applicable

RADIATION/SURGERY SEQ: |3|

0 Not applicable
2 Radiation before surgery
(3) Radiation after surgery
4 Before & after surgery
5 Intraoperative radiation
6 Intraoperative plus 2, 3 or 4
9 Sequence unknown

TEXT : Chest Wall 6000

PF 16 TRX3 – 1st COURSE TREATMENT (CHEMO, HORMONES, BRM, OTHER)

CHEMOTHERAPY

SUMMARY : |3|

AT THIS HOSPITAL : |3|

0 No chemotherapy
1 Chemotherapy, NOS
2 Chemotherapy, single agent
(3) Chemotherapy, multi-agent combination
7 Patient/guardian refused
8 Recommended, unk if done
9 Unknown

STARTED : (mm/dd/yyyy) |0|2| /|1|3| /|1|9|8|7|

TEXT : 5-FU, Adria, Ctx

HORMONE/STEROIDS

SUMMARY : |1|

AT THIS HOSPITAL : |1|

0 No hormonal therapy
(1) Hormonal therapy
2 Endocrine surg/radiation
3 Hormones + endocr surg/rad
7 Patient/guardian refused
8 Recommended, unk if done
9 Unknown

STARTED : (mm/dd/yyyy) |0|2| /|0|9| /|1|9|8|7|

TEXT : Tamoxifen

BIO-RESPONSE MODIFIER (BRM)

SUMMARY : |0|

AT THIS HOSPITAL : |0|

(0) No BRM
1 BRM
2 Allo BMT
3 Auto BMT
7 Patient/guardian refused
8 Recommended, unk if done
9 Unknown

STARTED : (mm/dd/yyyy) | | |/| | |/| | | | |

TEXT :

OTHER RX

SUMMARY : |0|

AT THIS HOSPITAL : |0|

(0) No other cancer directed rx
1 Other ca directed rx
2 Experimental ca rx
3 Double-blind study
6 Unproven therapy
7 Patient/guardian refused
8 Recommended, unk if done
9 Unknown

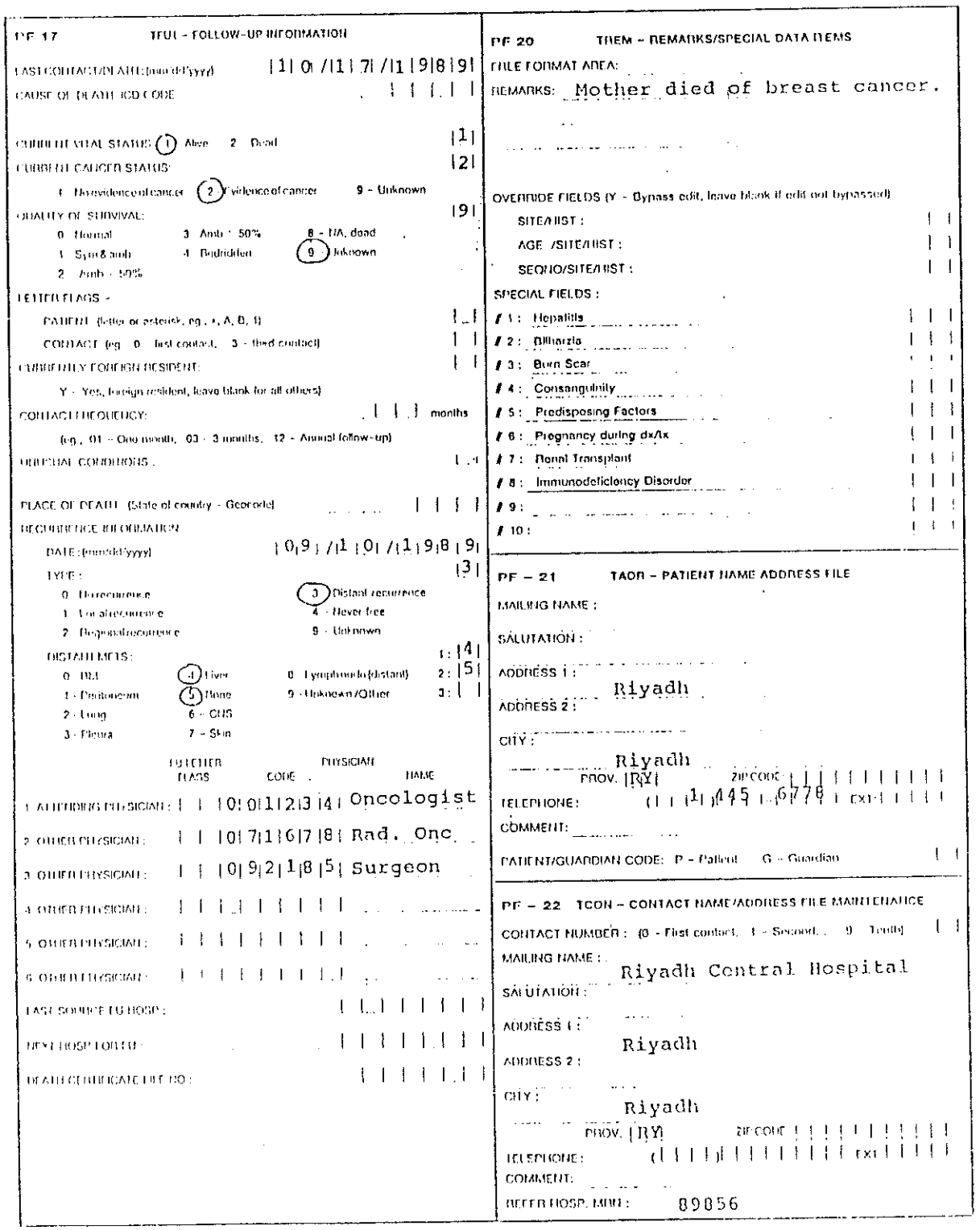
STARTED : (mm/dd/yyyy) | | |/| | |/| | | | |

TEXT :

PF 18 TRX2 – SUB. THERAPY

	Started mm/dd/yyyy	Course	Type	Code	Dose
1	| | |/| |/| | | | |	| |	| |	| | |	
2	| | |/| |/| | | | |	| |	| |	| | |	
3	| | |/| |/| | | | |	| |	| |	| | |	

FIGURE 1-D



PF 17 TFUL – FOLLOW-UP INFORMATION

LAST CONTACT/DEATH DATE (mm/dd/yyyy): 11/07/1998

CAUSE OF DEATH ICD CODE:

CURRENT VITAL STATUS: (1) Alive 2 Dead — 1

CURRENT CANCER STATUS: 2

1 No evidence of cancer (2) Evidence of cancer 9 – Unknown

QUALITY OF SURVIVAL: 9

0 Normal 3 Amb < 50% 8 – NA, dead

1 Sym & amb 4 Bedridden (9) Unknown

2 Amb > 50%

LETTER FLAGS –

PATIENT (letter or asterisk, eg , *, A, B, 1)

CONTACT (eg 0 last contact, 3 – third contact)

CURRENTLY FOREIGN RESIDENT:

Y – Yes, foreign resident, leave blank for all others)

CONTACT FREQUENCY: months

(eg , 01 – One month, 03 – 3 months, 12 – Annual follow-up)

ORBITAL CONDITIONS :

PLACE OF DEATH (State or country – Geocode)

RECURRENCE INFORMATION

DATE (mm/dd/yyyy): 09/01/1998

TYPE: 3

0 – No recurrence (3) Distant recurrence

1 – Local recurrence 4 – Never free

2 – Regional recurrence 9 – Unknown

DISTANT METS: 1: 4

0 – N/A (4) Liver 8 – Lymphnode (distant) 2: 5

1 – Peritoneum (5) Bone 9 – Unknown/Other 3:

2 – Lung 6 – CNS

3 – Pleura 7 – Skin

	LETTER FLAGS	CODE	PHYSICIAN NAME
1 ATTENDING PHYSICIAN:		00011234	Oncologist
2 OTHER PHYSICIAN:		07167 8	Rad. Onc.
3 OTHER PHYSICIAN:		09218 5	Surgeon
4 OTHER PHYSICIAN:			
5 OTHER PHYSICIAN:			
6 OTHER PHYSICIAN:			

LAST SOURCE TO HOSP:

NEXT HOSP TO BE F/U:

DEATH CERTIFICATE FILE NO:

PF 20 THEM – REMARKS/SPECIAL DATA ITEMS

FILE FORMAT AREA:

REMARKS: Mother died of breast cancer.

OVERRIDE FIELDS (Y – Bypass edit, leave blank if edit not bypassed)

SITE/HIST :

AGE /SITE/HIST :

SEQNO/SITE/HIST :

SPECIAL FIELDS :

1 : Hepatitis

2 : Bilharzia

3 : Burn Scar

4 : Consanguinity

5 : Predisposing Factors

6 : Pregnancy during dx/tx

7 : Renal Transplant

8 : Immunodeficiency Disorder

9 :

10 :

PF – 21 TAOR – PATIENT NAME ADDRESS FILE

MAILING NAME :

SALUTATION :

ADDRESS 1 :

ADDRESS 2 : Riyadh

CITY :

Riyadh

PROV. RY ZIP CODE

TELEPHONE: (1) 445 6778 EXT

COMMENT:

PATIENT/GUARDIAN CODE: P – Patient G – Guardian

PF – 22 TCON – CONTACT NAME/ADDRESS FILE MAINTENANCE

CONTACT NUMBER : (0 – First contact, 1 – Second, . 9 – Tenth)

MAILING NAME : Riyadh Central Hospital

SALUTATION :

ADDRESS 1 :

Riyadh

ADDRESS 2 :

CITY :

Riyadh

PROV. RY ZIP CODE

TELEPHONE: EXT

COMMENT:

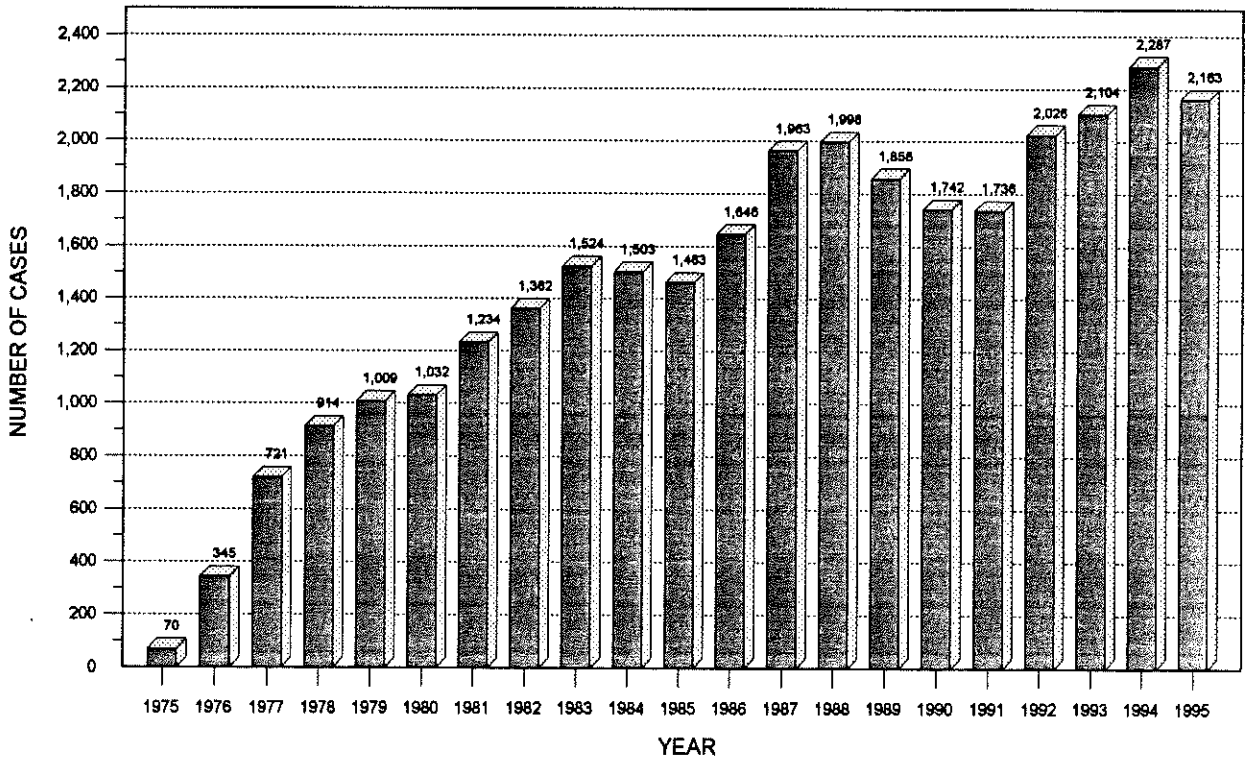
REFER HOSP. MNU : 89056

II. RFSH&RC CANCER PATIENT POPULATION

A total of 2,163 cases were accessioned in 1995, with 1,094 males and 1,069 females or a male/female ratio of 1.1:1. This represents a 5.4% decrease from 1994.

FIGURE 2

DISTRIBUTION OF ALL CASES ACCESSIONED BY YEAR
1975 - 1995 (TOTAL CASES = 30,700)



From the opening of the hospital (mid 1975) until December 1995, 30,700 cancer cases were registered (16,766 males and 13,934 females) with a male/female ratio of 1.2:1. There were 3,880 (12.6%) pediatric cases (0 to 14 years of age) and 26,820 (87.4%) adults (15 years old and above). A slight difference in the proportion was noted in 1995, 13.2% (286) for pediatrics and 86.8% (1,877) for adults.

TABLE 1

ALL CASES SEEN AT KFSH&RC (MALE/FEMALE & PEDIATRICS/ADULTS) BY 5-YEAR PERIOD 1975 - 1995

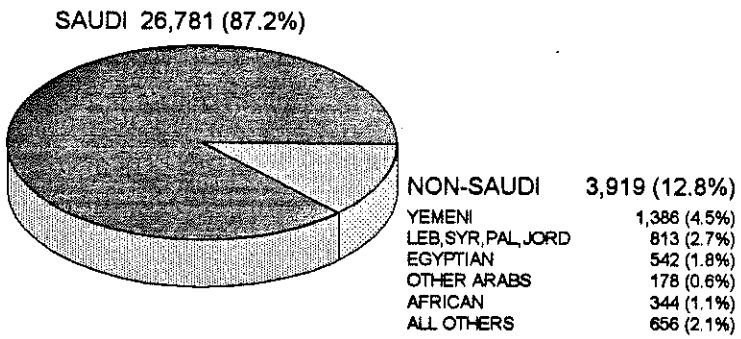
	1975-1976*		1977-1981		1982-1986		1987-1991		1992-1995		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
MALE	280		2,972		4,141		4,963		4,410		16,766	
FEMALE	135		1,938		3,357		4,334		4,170		13,934	
TOTAL	415		4,910		7,498		9,297		8,580		30,700	
M/F RATIO	2.1:1		1.5:1		1.2:1		1.1:1		1.1:1		1.2:1	
PEDIATRICS**	55	13.2	590	12.0	986	13.2	1,159	12.5	1,090	12.7	3,880	12.6
ADULTS	360	86.8	4,320	88.0	6,512	86.8	8,138	87.5	7,490	87.3	26,820	87.4
TOTAL	415	100	4,910	100	7,498	100	9,297	100	8,580	100	30,700	100

* First two years of KFSH&RC partial operation.
** Pediatrics = 0 to 14 years of age; Adults = 15 years and above.

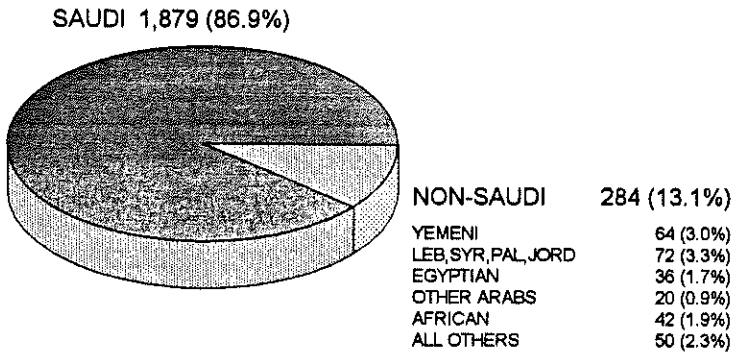
FIGURE 3

DISTRIBUTION OF ALL CASES BY NATIONALITY

1975 - 1995 (TOTAL CASES = 30,700)



1995 CASES (TOTAL = 2,163)



Saudi nationals totaled 1,879 (86.9%) in 1995 and the non-Saudi, 284 (13.1%). During the period 1975 to 1995, the former accounted for 87.2% (26,781) while the latter, 12.8% (3,919).

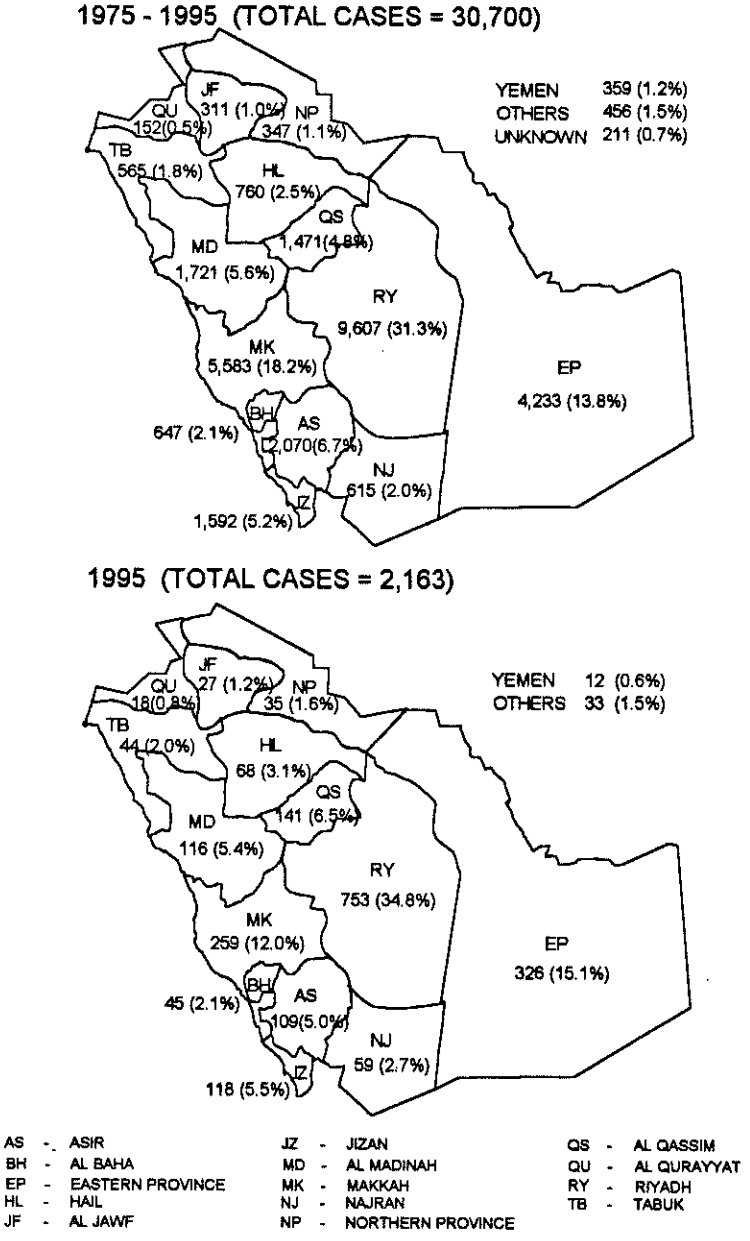
Geographically, the referral pattern is mainly from the Riyadh Region with 34.8% of all cases, followed by the Eastern Province and the Makkah Region with 15.1% and 12.0%, respectively, in 1995. The same regions had the most number of cases during the 21 years in review, i.e., 31.3% from Riyadh, 18.2% from Makkah and 13.8% from the Eastern Province.

These percentages reflect KFSH&RC actual experience rather than adjusted to reflect the population of those regions.

FIGURE 4

DISTRIBUTION OF ALL CASES BY GEOGRAPHIC REGION

(Based on Given Address at the Time of Diagnosis)



TRENDS IN RELATIVE FREQUENCY OF CANCER AT KFSH&RC

The crude relative frequency is the proportion of a given cancer in relation to all cases in a clinical or pathological series. Although such frequencies are subject to many biases, historically many elevated frequencies have been confirmed when complete cancer registration was introduced.

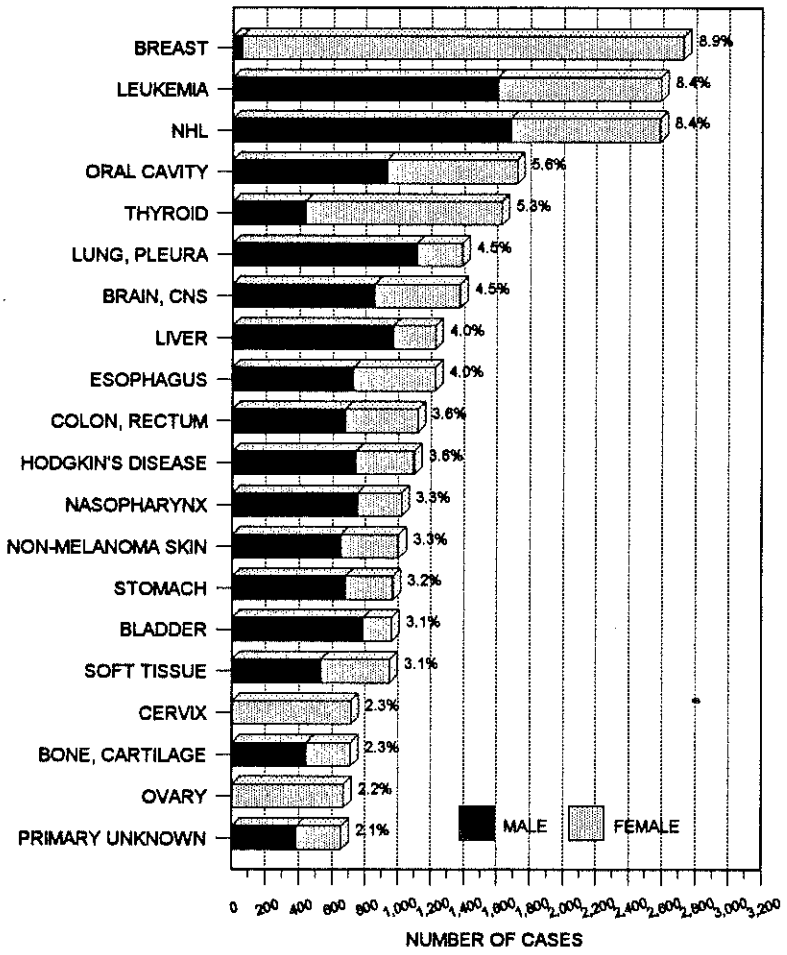
Biases that may have an affect on the relative frequencies of cancer cases at KFSH&RC include:

- possible nonusage of medical services by some of the population so that the hospital population may not reflect the disease state of the community
- resistance to examination by part of the female population
- absence of postmortem examinations/death certificates
- selective referral of certain malignancies because of a specialty service available
- eligibility criteria for admission to KFSH&RC
- age distribution of the population

Breast cancer led the list of total cancer cases seen from 1975 to 1995 with 8.9%, followed by Leukemia (8.4%), Non-Hodgkin's Lymphoma (8.4%), Oral Cavity (5.6%) and Thyroid (5.3%).

FIGURE 5

DISTRIBUTION OF 20 MOST COMMON MALIGNANCIES
1975 - 1995 (TOTAL CASES = 30,700)



Cancer among pediatrics (under the age of 15) accounted for 12.6% of all cases from 1975 to 1995. The five most common pediatric malignancies were Leukemia (26.4%), Lymphoma (20.3%)[NHL 12.1% and HD 8.2%], Brain/CNS (15.9%), Soft Tissue (8.2%) and Eye (7.3%).

FIGURE 6

DISTRIBUTION OF 10 MOST COMMON PEDIATRIC MALIGNANCIES
1975 - 1995 (TOTAL CASES = 3,880)

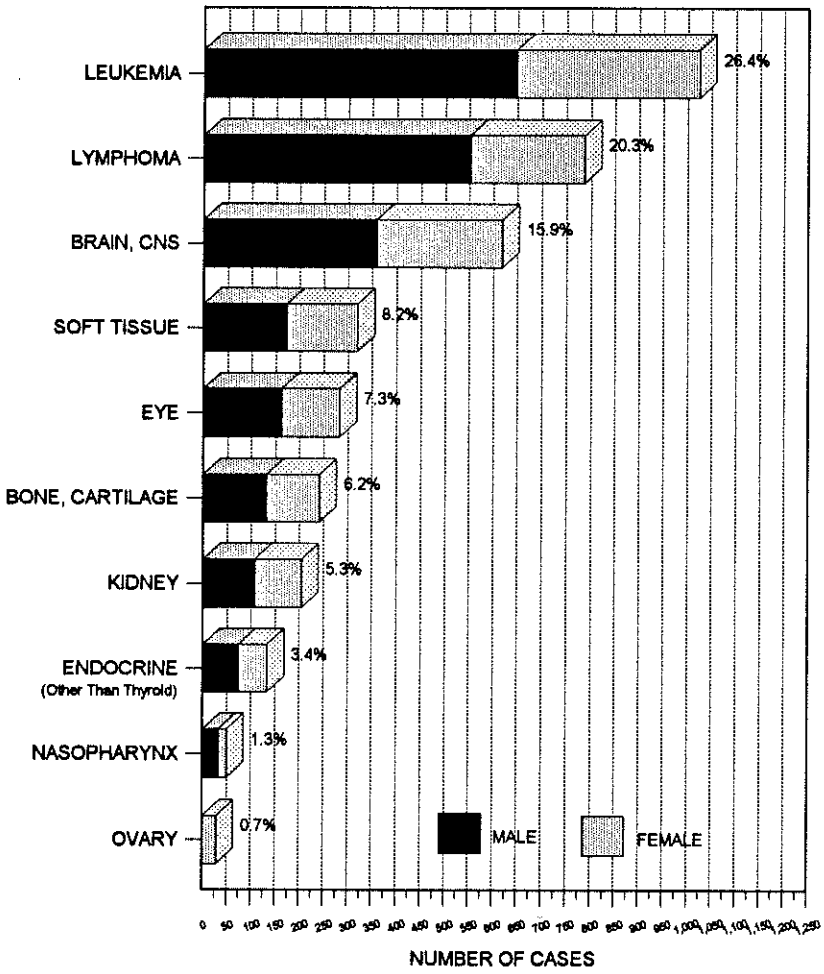


Table 2 shows the number of all malignant cases seen at KFSH&RC from 1975 to 1995 by site and year and Table 3, the 5-year summaries.

FIGURE 7

DISTRIBUTION OF 10 MOST COMMON PEDIATRIC MALIGNANCIES
BY HISTOLOGY, 1975 - 1995 (TOTAL CASES = 3,880)

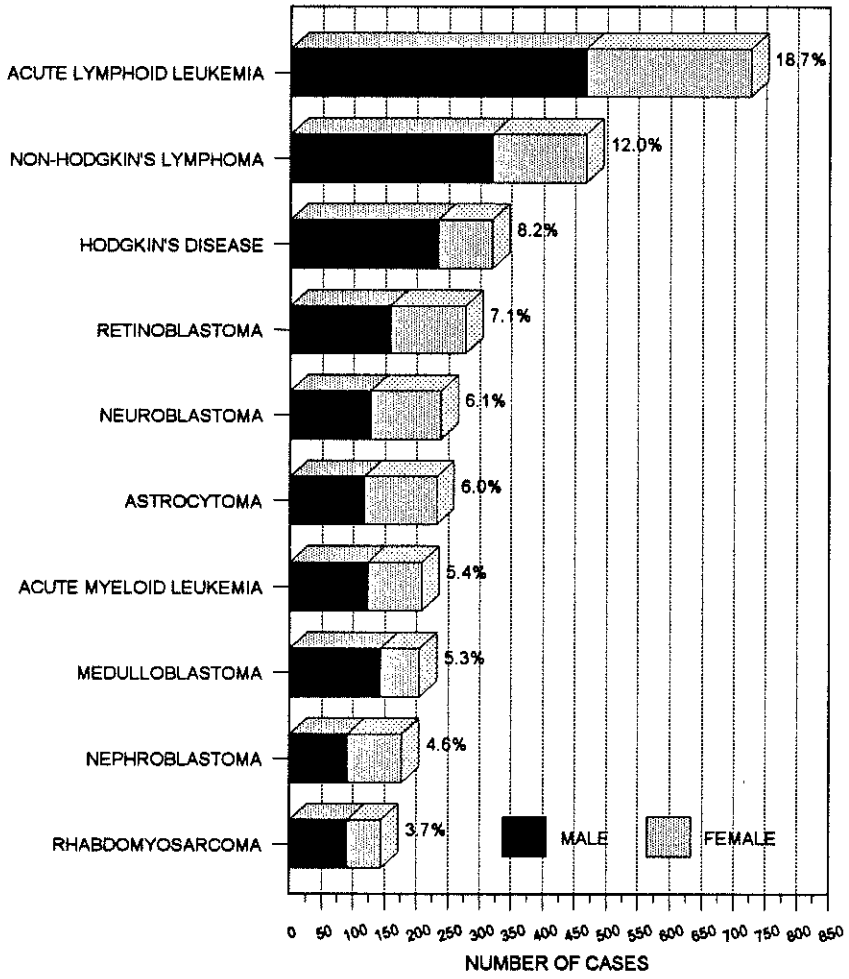


TABLE 2

ALL CASES SEEN AT KFSH&RC BY SITE* AND YEAR

1975 - 1995

SITE	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	TOTAL
Oral Cavity	1	14	33	79	69	70	56	80	101	78	100	75	95	128	104	103	103	112	98	97	121	1,717
Nasopharynx	3	11	38	34	37	35	48	45	65	46	45	49	80	65	62	62	62	53	59	58	62	1,019
Esophagus	1	15	51	62	67	67	57	62	75	77	56	69	77	66	68	72	66	68	47	50	50	1,223
Stomach	2	15	32	35	50	37	50	50	66	59	48	63	59	47	50	51	36	47	43	68	60	968
Colon, Rectum	1	13	22	24	31	37	47	38	42	59	45	50	70	82	61	64	80	88	83	93	88	1,118
Liver	7	15	33	44	49	33	41	54	53	65	56	84	77	71	68	54	65	75	81	102	99	1,226
Pancreas	1	5	7	11	15	14	20	22	14	20	17	27	19	16	27	12	13	26	21	22	25	354
Other G.I.	2	5	10	11	11	14	11	10	11	13	16	22	28	22	21	20	13	29	30	32	21	352
Larynx	1	5	11	12	12	14	22	13	23	21	25	16	24	33	21	26	34	27	31	35	38	444
Lung, Pleura	3	11	24	34	45	39	55	63	76	74	88	84	83	108	91	75	84	83	89	93	87	1,389
Multiple Myeloma	0	5	6	11	7	9	7	13	9	12	14	12	24	20	29	13	24	24	23	32	23	317
Lymphoid Leukemia	4	14	15	38	32	38	53	69	65	48	59	84	92	78	75	55	74	78	89	71	80	1,211
Myeloid Leukemia	3	13	22	44	50	37	62	50	41	69	56	72	86	71	72	70	71	60	93	82	104	1,228
Other Leukemias	0	1	3	5	9	7	6	6	10	10	6	3	7	8	9	7	12	5	10	14	9	147
Reticuloendothelium	0	1	0	1	1	1	1	1	1	1	1	6	2	1	1	1	0	0	0	2	0	22
Bone, Cartilage	1	6	14	25	21	20	23	41	35	40	23	31	40	46	45	37	41	52	55	60	56	712
Soft Tissue	1	14	28	29	32	26	33	42	32	39	42	50	53	49	64	68	72	51	54	83	88	950
Skin Melanoma	0	4	4	8	8	6	7	4	11	12	7	7	11	12	6	5	9	14	8	7	6	156
Non-Melanoma Skin Ca	2	14	27	32	48	40	49	58	54	56	69	70	49	51	58	46	52	61	54	65	48	1,003
Breast	3	24	53	46	57	64	101	110	111	151	131	126	174	193	137	168	168	187	249	240	228	2,721
Uterus, Genital	1	2	12	12	14	12	17	16	35	23	21	28	36	37	34	34	33	41	36	54	39	537
Cervix	0	10	18	18	25	18	23	25	33	32	41	54	51	50	33	44	35	52	50	52	49	713
Ovary	2	6	10	10	17	21	20	36	32	28	24	35	43	49	53	46	37	45	54	50	52	670
Prostate	0	7	5	4	5	10	12	18	28	19	20	16	22	27	27	24	16	40	26	45	36	407
Testis, Genital	0	4	10	8	13	11	18	13	11	15	17	14	20	20	13	19	16	22	28	25	14	311
Bladder	4	7	12	24	30	39	36	23	42	36	45	52	79	74	73	59	44	64	87	71	60	961
Kidney, Urinary	0	9	18	18	18	15	18	31	23	22	26	43	34	59	33	34	35	53	51	65	48	653
Eye	0	6	11	17	11	22	27	34	25	16	30	22	32	41	23	28	6	15	38	25	12	441
Brain, CNS	3	24	27	40	26	31	31	77	52	58	49	72	88	92	98	81	84	112	88	117	125	1,375
Thyroid	2	8	17	28	33	44	57	51	65	71	63	82	119	112	110	93	110	141	133	157	128	1,624
Other Endocrine	1	1	2	2	2	9	9	8	14	9	19	9	12	13	2	6	8	14	11	10	8	169
NHL - Lymph Nodes	4	19	62	70	96	94	99	95	125	106	88	84	96	100	92	92	70	89	79	79	68	1,707
NHL - Extra-nodal	0	4	11	5	7	18	30	21	47	33	36	57	61	53	73	62	52	61	75	79	89	874
Hodgkin's Disease-LNs	13	19	40	41	35	42	46	42	53	50	48	44	64	57	74	56	56	72	71	75	88	1,086
HD - Extra-nodal	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	3	2	2	0	10
Primary Unknown	3	11	23	24	20	27	32	29	33	26	22	23	35	32	43	41	40	50	42	62	36	654
All Other Sites	1	3	10	8	6	11	10	12	10	9	10	10	21	15	7	14	15	12	16	13	18	231
TOTAL	70	345	721	914	1009	1032	1234	1362	1524	1503	1463	1646	1963	1998	1858	1742	1736	2026	2104	2287	2163	30,700

* Includes Multiple Primary Neoplasms.

TABLE 3

ALL CASES SEEN AT KFSH&RC BY SITE* AND 5-YEAR PERIOD

1975 - 1995

SITE	1975-1976**		1977-1981		1982-1986		1987-1991		1992-1995		TOTAL	
	No	%	No	%	No	%	No	%	No	%	No	%
Oral Cavity	15	3.6%	307	6.3%	434	5.8%	533	5.7%	428	5.0%	1,717	5.6%
Nasopharynx	14	3.4%	192	3.9%	250	3.3%	331	3.6%	232	2.7%	1,019	3.3%
Esophagus	16	3.9%	304	6.2%	339	4.5%	349	3.8%	215	2.5%	1,223	4.0%
Stomach	17	4.1%	204	4.2%	286	3.8%	243	2.6%	218	2.5%	968	3.2%
Colon, Rectum	14	3.4%	161	3.3%	234	3.1%	357	3.8%	352	4.1%	1,118	3.6%
Liver	22	5.3%	200	4.1%	312	4.2%	335	3.6%	357	4.2%	1,226	4.0%
Pancreas	6	1.4%	67	1.4%	100	1.3%	87	0.9%	94	1.1%	354	1.2%
Other G.I.	7	1.7%	57	1.2%	72	1.0%	104	1.1%	112	1.3%	352	1.1%
Larynx	6	1.4%	71	1.4%	98	1.3%	138	1.5%	131	1.5%	444	1.4%
Lung, Pleura	14	3.4%	197	4.0%	385	5.1%	441	4.7%	352	4.1%	1,389	4.5%
Multiple Myeloma	5	1.2%	40	0.8%	60	0.8%	110	1.2%	102	1.2%	317	1.0%
Lymphoid Leukemia	18	4.3%	176	3.6%	325	4.3%	374	4.0%	318	3.7%	1,211	3.9%
Myeloid Leukemia	16	3.9%	215	4.4%	288	3.8%	370	4.0%	339	4.0%	1,228	4.0%
Other Leukemias	1	0.2%	30	0.6%	35	0.5%	43	0.5%	38	0.4%	147	0.5%
Reticuloendothelium	1	0.2%	4	0.1%	10	0.1%	5	0.1%	2	0.0%	22	0.1%
Bone, Cartilage	7	1.7%	103	2.1%	170	2.3%	209	2.2%	223	2.6%	712	2.3%
Soft Tissue	15	3.6%	148	3.0%	205	2.7%	306	3.3%	276	3.2%	950	3.1%
Skin Melanoma	4	1.0%	33	0.7%	41	0.5%	43	0.5%	35	0.4%	156	0.5%
Non-Melanoma Skin Ca	16	3.9%	196	4.0%	307	4.1%	256	2.8%	228	2.7%	1,003	3.3%
Breast	27	6.5%	321	6.5%	629	8.4%	840	9.0%	904	10.5%	2,721	8.9%
Uterus, Genital	3	0.7%	67	1.4%	123	1.6%	174	1.9%	170	2.0%	537	1.7%
Cervix	10	2.4%	102	2.1%	185	2.5%	213	2.3%	203	2.4%	713	2.3%
Ovary	8	1.9%	78	1.6%	155	2.1%	228	2.5%	201	2.3%	670	2.2%
Prostate	7	1.7%	36	0.7%	101	1.3%	116	1.2%	147	1.7%	407	1.3%
Testis, Genital	4	1.0%	60	1.2%	70	0.9%	88	0.9%	89	1.0%	311	1.0%
Bladder	11	2.7%	141	2.9%	198	2.6%	329	3.5%	282	3.3%	961	3.1%
Kidney, Urinary	9	2.2%	87	1.8%	145	1.9%	195	2.1%	217	2.5%	653	2.1%
Eye	6	1.4%	88	1.8%	127	1.7%	130	1.4%	90	1.0%	441	1.4%
Brain, CNS	27	6.5%	155	3.2%	308	4.1%	443	4.8%	442	5.2%	1,375	4.5%
Thyroid	10	2.4%	179	3.6%	332	4.4%	544	5.9%	559	6.5%	1,624	5.3%
Other Endocrine	2	0.5%	24	0.5%	59	0.8%	41	0.4%	43	0.5%	169	0.6%
NHL - Lymph Nodes	23	5.5%	421	8.6%	498	6.6%	450	4.8%	315	3.7%	1,707	5.6%
NHL - Extra-nodal	4	1.0%	71	1.4%	194	2.6%	301	3.2%	304	3.5%	874	2.8%
Hodgkin's Disease-LNs	32	7.7%	204	4.2%	237	3.2%	307	3.3%	306	3.6%	1,086	3.5%
HD - Extra-nodal	0	0.0%	0	0.0%	2	0.0%	1	0.0%	7	0.1%	10	0.0%
Primary Unknown	14	3.4%	126	2.6%	133	1.8%	191	2.1%	190	2.2%	654	2.1%
All Other Sites	4	1.0%	45	0.9%	51	0.7%	72	0.8%	59	0.7%	231	0.8%
TOTAL	415	100.0%	4,910	100.0%	7,498	100.0%	9,297	100.0%	8,580	100.0%	30,700	100.0%

* Includes Multiple Primary Neoplasms.

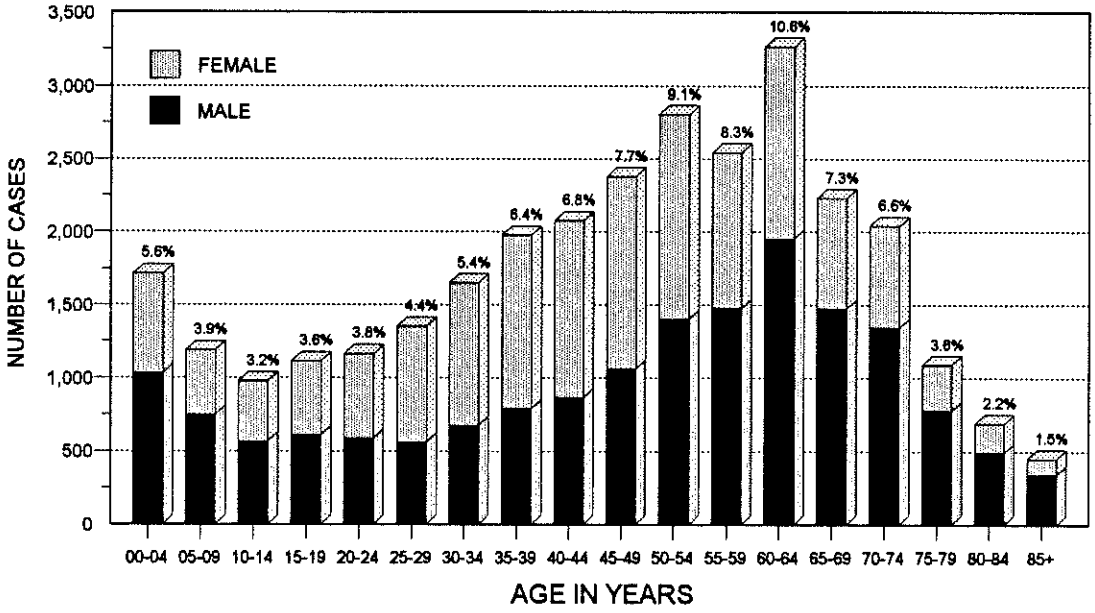
** First Two Years of KFSH&RC Partial Operation.

The largest number of cases was noted in the 5th and 6th decades in males and in the 4th and 5th in females. In 1995, the mean age was 44.4, the median was 47.1 and the mode was 60. Pediatric malignancies are most common among children three years of age.

FIGURE 8

DISTRIBUTION OF ALL CASES BY AGE AT DIAGNOSIS

1975 - 1995 (TOTAL CASES = 30,700)



1995 (TOTAL CASES = 2,163)

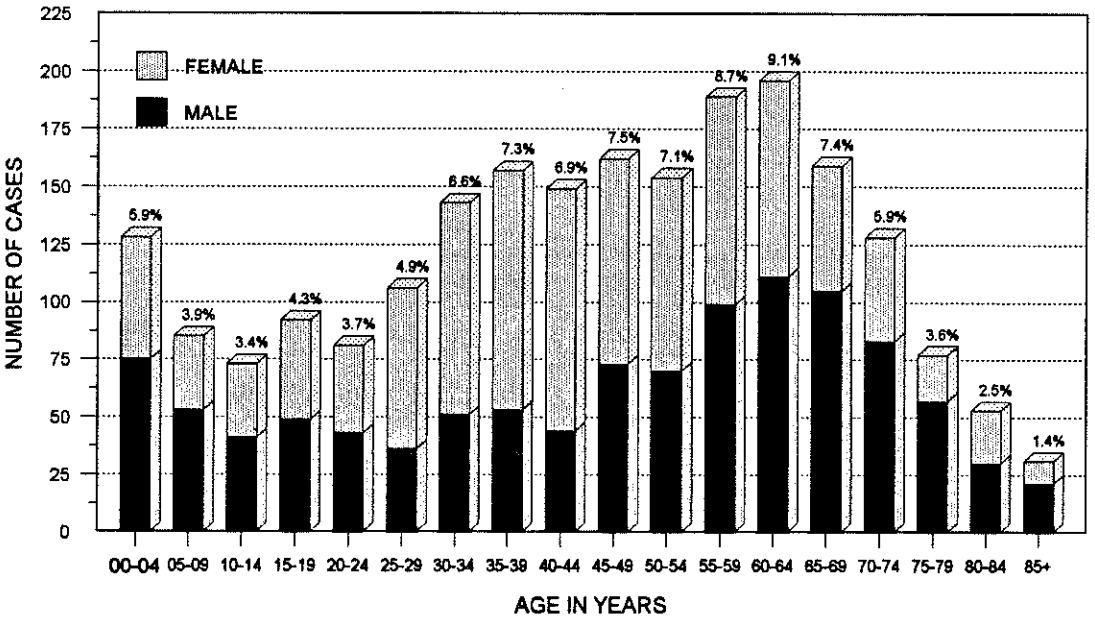
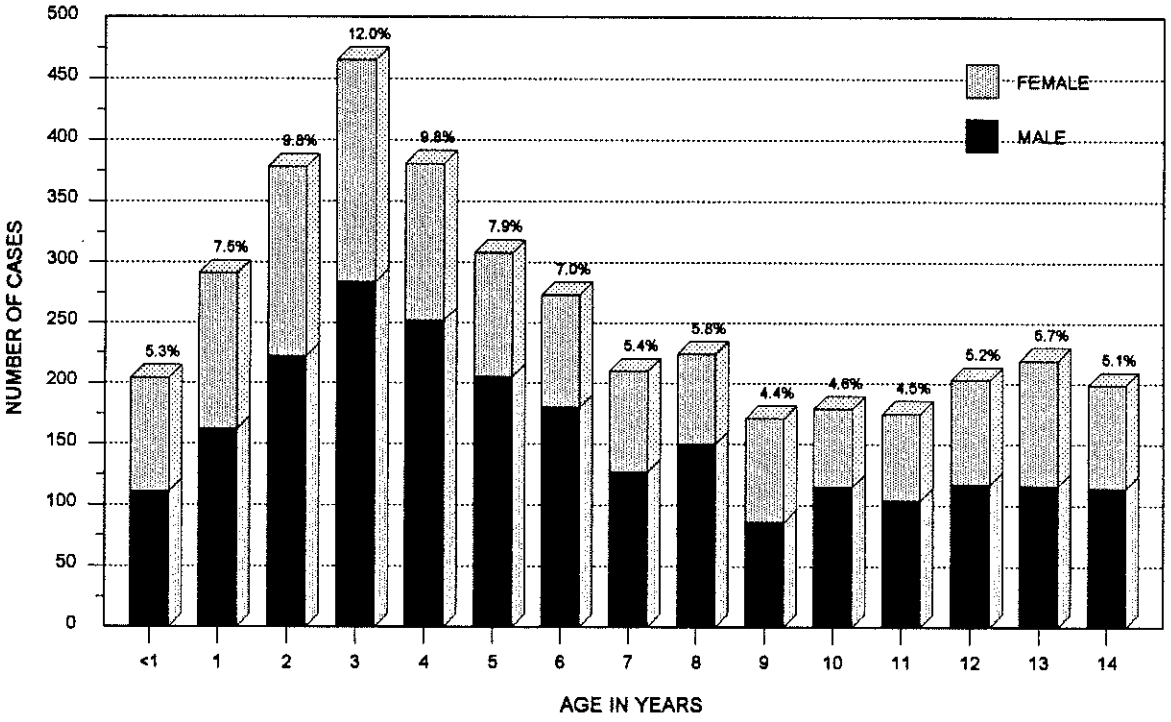


FIGURE 9

DISTRIBUTION OF ALL PEDIATRIC CASES BY AGE AT DIAGNOSIS
1975 - 1995 (TOTAL CASES = 3,880)



Of the 2,163 cases in 1995, 1,815 (83.9%) were **analytic** (defined as cases which were first diagnosed and/or received all or part of their first course of treatment at KFSH&RC. The remaining 348 cases (16.1%) were **non-analytic** (defined as cases diagnosed elsewhere and received all of their first course of treatment elsewhere). Out of the 1,815 analytic cases, pediatric cases totaled 244, with 146 males and 98 females.

See Table 4 for the distribution of cases by site, sex, class of case, and stage at diagnosis and Tables 5, 6 and 7 for the distributions of analytic cases by site, sex and age at diagnosis.

TABLE 4

ALL CASES SEEN AT KFSH&RC BY SITE*, SEX, CLASS OF CASE AND SUMMARY STAGE

1995

SITE	TOTAL		SEX		CLASS OF CASE**		ANALYTIC CASES GENERAL SUMMARY STAGE				
	Number	%	Male	Female	Analytic	Non-Anal	In Situ	Localized	Regional	Distant	Unstageable
Breast	228	10.5%	1	227	197	31	5	59	99	31	3
Leukemia	193	8.9%	113	80	157	36	0	0	0	157	0
Non-Hodgkin's Lymphoma	157	7.3%	93	64	136	21	0	26	52	58	0
Thyroid	128	5.9%	25	103	119	9	0	57	50	10	2
Brain, CNS	125	5.8%	74	51	111	14	0	77	31	0	3
Oral Cavity	121	5.6%	63	58	102	19	0	16	62	24	0
Liver	99	4.6%	75	24	78	21	0	25	21	26	6
Colon, Rectum	88	4.1%	49	39	69	19	0	11	33	22	3
Hodgkin's Disease	88	4.1%	53	35	78	10	0	16	36	26	0
Soft Tissue	88	4.1%	53	35	70	18	0	29	21	18	2
Lung, Pleura	87	4.0%	70	17	80	7	0	7	32	40	1
Nasopharynx	62	2.9%	40	22	56	6	0	3	29	24	0
Stomach	60	2.8%	46	14	47	13	0	3	31	11	2
Bladder	60	2.8%	47	13	43	17	2	23	15	3	0
Bone, Cartilage	56	2.6%	36	20	52	4	0	4	35	13	0
Ovary	52	2.4%	0	52	44	8	0	13	3	27	1
Esophagus	50	2.3%	25	25	41	9	0	10	16	8	7
Cervix	49	2.3%	0	49	45	4	2	5	31	7	0
Non-Melanoma Skin Ca	48	2.2%	34	14	34	14	0	27	4	3	0
Kidney, Urinary	48	2.2%	31	17	41	7	1	22	8	10	0
Uterus, Genital	39	1.8%	0	39	32	7	1	17	8	4	2
Larynx	38	1.8%	38	0	31	7	1	15	9	6	0
Prostate	36	1.7%	36	0	24	12	0	10	2	12	0
Primary Unknown	36	1.7%	18	18	28	8	0	0	0	0	28
Pancreas	25	1.2%	14	11	20	5	0	1	14	4	1
Multiple Myeloma	23	1.1%	15	8	16	7	0	0	0	16	0
Other G.I.	21	1.0%	8	13	16	5	0	3	3	9	1
All Other Sites	18	0.8%	9	9	17	1	0	1	12	4	0
Testis, Genital	14	0.6%	14	0	12	2	0	7	2	3	0
Eye	12	0.6%	6	6	10	2	0	3	7	0	0
Other Endocrine	8	0.4%	6	2	6	2	0	0	1	5	0
Skin Melanoma	6	0.3%	2	4	3	3	0	2	0	1	0
TOTAL	2,163	100.0%	1,094	1,069	1,815	348	12	492	667	582	62

* Includes Multiple Primary Neoplasms.

** Analytic Cases - cases which were first diagnosed and/or received all or part of their first course of treatment at KFSH&RC.

Non-Analytic Cases - cases which were diagnosed elsewhere and received all of their first course of treatment elsewhere.

TABLE 5

ANALYTIC CASES SEEN AT KFSH&RC BY SITE* AND AGE

1995

SITE	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	TOTAL
Oral Cavity	1	0	0	1	2	2	3	8	10	2	7	10	14	12	12	10	6	2	102
Nasopharynx	0	1	3	4	3	4	7	3	5	6	3	7	2	4	2	0	1	1	56
Esophagus	0	0	0	0	0	0	1	2	1	2	1	4	4	4	7	6	5	4	41
Stomach	0	0	0	0	1	2	2	1	3	4	3	5	6	6	5	7	1	1	47
Colon, Rectum	0	0	0	0	2	3	1	7	2	11	10	7	10	10	2	3	1	0	69
Liver	0	0	0	1	0	1	4	2	10	6	6	13	10	11	9	3	0	2	78
Pancreas	0	0	0	0	1	0	0	2	2	0	1	3	4	3	3	0	1	0	20
Other G.I.	1	0	0	1	0	0	1	0	2	1	1	5	0	0	3	1	0	0	16
Larynx	0	0	0	0	0	1	1	1	3	1	5	3	5	6	2	1	1	1	31
Lung, Pleura	0	0	0	0	1	0	2	0	3	8	9	6	13	18	9	5	6	0	80
Multiple Myeloma	0	0	0	0	0	0	0	0	1	2	1	3	0	4	4	1	0	0	16
Lymphoid Leukemia	23	16	7	8	1	2	2	2	0	2	0	1	2	1	1	0	0	1	69
Myeloid Leukemia	8	7	7	8	6	7	11	8	4	1	4	3	3	0	1	0	1	0	79
Other Leukemias	2	1	1	0	0	0	0	0	0	0	3	1	1	0	0	0	0	0	9
Bone, Cartilage	3	4	13	11	8	3	2	1	1	2	1	2	0	0	0	1	0	0	52
Soft Tissue	9	10	2	9	9	2	4	3	4	6	2	3	5	1	0	1	0	0	70
Skin Melanoma	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	3
Non-Melanoma Skin Ca	0	1	0	0	0	0	1	1	0	4	2	6	4	5	3	3	1	3	34
Breast	0	0	0	0	2	13	19	37	35	30	17	17	15	7	3	0	1	1	197
Uterus, Genital	0	0	0	1	1	0	1	3	2	3	4	5	4	1	2	1	3	1	32
Cervix	0	0	0	0	0	5	6	6	5	4	2	7	6	2	0	0	2	0	45
Ovary	0	0	2	2	1	2	4	1	3	5	4	4	9	0	2	2	3	0	44
Prostate	0	0	0	0	0	0	0	0	0	0	0	1	8	6	1	4	4	0	24
Testis, Genital	2	0	0	1	1	3	1	1	1	2	0	0	0	0	0	0	0	0	12
Bladder	2	0	0	0	1	1	2	1	5	3	3	1	8	0	7	5	3	1	43
Kidney, Urinary	10	1	0	0	0	0	1	3	2	3	13	1	4	1	1	1	0	0	41
Eye	7	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	10
Brain, CNS	22	18	13	8	7	5	6	4	3	5	3	4	7	3	3	0	0	0	111
Thyroid	0	1	1	5	10	17	21	13	11	7	7	8	5	8	2	1	0	2	119
Other Endocrine	4	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	6
NHL - Lymph Nodes	6	1	2	2	4	4	6	3	2	3	1	6	5	4	4	2	2	0	57
NHL - Extra-nodal	2	4	3	0	3	5	4	4	4	5	4	7	6	8	8	7	2	3	79
Hodgkin's Disease-LNs	4	9	9	17	8	5	6	5	1	3	4	3	1	0	1	0	1	1	78
HD - Extra-nodal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Unknown	0	0	0	0	0	0	1	1	2	4	1	3	5	3	3	2	2	1	28
All Other Sites	1	0	0	3	1	1	2	0	0	2	1	2	1	0	2	1	0	0	17
TOTAL	107	74	63	82	73	90	122	125	127	138	124	151	168	128	102	68	47	26	1,815

* Includes Multiple Primary Neoplasms.

TABLE 6

ANALYTIC "MALE" CASES SEEN AT KFSH&RC BY SITE* AND AGE

1995

SITE	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	TOTAL
Oral Cavity	1	0	0	0	2	0	1	4	3	0	3	8	8	6	5	6	4	1	52
Nasopharynx	0	1	2	1	1	2	4	3	3	3	0	7	2	4	2	0	0	1	36
Esophagus	0	0	0	0	0	0	0	0	0	0	1	2	4	2	3	4	3	2	21
Stomach	0	0	0	0	0	1	2	0	2	4	1	4	4	6	5	5	1	1	36
Colon, Rectum	0	0	0	0	2	1	0	4	0	7	6	3	3	5	2	3	1	0	37
Liver	0	0	0	0	0	0	3	0	4	6	5	11	9	8	8	3	0	1	58
Pancreas	0	0	0	0	0	0	0	1	1	0	1	2	3	1	2	0	1	0	12
Other G.I.	1	0	0	0	0	0	1	0	1	0	0	2	0	0	1	1	0	0	7
Larynx	0	0	0	0	0	1	1	1	3	1	5	3	5	6	2	1	1	1	31
Lung, Pleura	0	0	0	0	1	0	1	0	3	6	8	6	12	13	7	4	4	0	65
Multiple Myeloma	0	0	0	0	0	0	0	0	1	1	0	1	0	3	3	0	0	0	9
Lymphoid Leukemia	13	11	6	6	1	2	0	2	0	2	0	1	1	1	1	0	0	1	48
Myeloid Leukemia	6	5	4	3	1	5	5	1	1	0	2	3	1	0	1	0	0	0	38
Other Leukemias	1	0	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	5
Bone, Cartilage	0	3	7	7	8	1	2	0	0	2	1	1	0	0	0	1	0	0	33
Soft Tissue	6	5	2	5	5	1	3	1	1	4	2	1	3	0	0	1	0	0	40
Skin Melanoma	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Non-Melanoma Skin Ca	0	1	0	0	0	0	1	1	0	3	1	4	3	4	1	3	0	2	24
Breast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uterus, Genital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cervix	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ovary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prostate	0	0	0	0	0	0	0	0	0	0	0	1	8	6	1	4	4	0	24
Testis, Genital	2	0	0	1	1	3	1	1	1	2	0	0	0	0	0	0	0	0	12
Bladder	0	0	0	0	1	0	0	1	4	2	2	1	8	0	6	5	3	0	33
Kidney, Urinary	7	1	0	0	0	0	0	1	1	2	11	1	2	1	1	1	0	0	29
Eye	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	6
Brain, CNS	12	9	7	6	3	3	5	2	2	2	0	3	5	1	2	0	0	0	62
Thyroid	0	1	0	1	2	1	2	2	1	2	2	2	1	5	1	0	0	2	25
Other Endocrine	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4
NHL - Lymph Nodes	4	1	0	2	2	3	4	1	1	1	0	4	5	4	1	1	0	0	34
NHL - Extra-nodal	1	4	1	0	1	3	4	3	2	4	3	4	1	5	3	4	1	3	47
Hodgkin's Disease-LNs	3	3	7	9	6	2	2	5	0	3	3	1	0	0	1	0	1	1	47
HD - Extra-nodal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Unknown	0	0	0	0	0	0	0	1	1	1	0	1	2	2	2	2	1	0	13
All Other Sites	0	0	0	2	0	1	2	0	0	1	1	0	1	0	0	1	0	0	9
TOTAL	64	45	37	43	37	30	44	36	36	60	60	78	92	83	61	50	25	17	898

* Includes Multiple Primary Neoplasms.

TABLE 7

ANALYTIC "FEMALE" CASES SEEN AT KFSH&RC BY SITE* AND AGE

1995

SITE	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	TOTAL
Oral Cavity	0	0	0	1	0	2	2	4	7	2	4	2	6	6	7	4	2	1	50
Nasopharynx	0	0	1	3	2	2	3	0	2	3	3	0	0	0	0	0	1	0	20
Esophagus	0	0	0	0	0	0	1	2	1	2	0	2	0	2	4	2	2	2	20
Stomach	0	0	0	0	1	1	0	1	1	0	2	1	2	0	0	2	0	0	11
Colon, Rectum	0	0	0	0	0	2	1	3	2	4	4	4	7	5	0	0	0	0	32
Liver	0	0	0	1	0	1	1	2	6	0	1	2	1	3	1	0	0	1	20
Pancreas	0	0	0	0	1	0	0	1	1	0	0	1	1	2	1	0	0	0	8
Other G.I.	0	0	0	1	0	0	0	0	1	1	1	3	0	0	2	0	0	0	9
Larynx	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lung, Pleura	0	0	0	0	0	0	1	0	0	2	1	0	1	5	2	1	2	0	15
Multiple Myeloma	0	0	0	0	0	0	0	0	0	1	1	2	0	1	1	1	0	0	7
Lymphoid Leukemia	10	5	1	2	0	0	2	0	0	0	0	0	1	0	0	0	0	0	21
Myeloid Leukemia	2	2	3	5	5	2	6	7	3	1	2	0	2	0	0	0	1	0	41
Other Leukemias	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	4
Bone, Cartilage	3	1	6	4	0	2	0	1	1	0	0	1	0	0	0	0	0	0	19
Soft Tissue	3	5	0	4	4	1	1	2	3	2	0	2	2	1	0	0	0	0	30
Skin Melanoma	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
Non-Melanoma Skin Ca	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2	0	1	1	10
Breast	0	0	0	0	2	13	19	37	35	30	17	17	15	7	3	0	1	1	197
Uterus, Genital	0	0	0	1	1	0	1	3	2	3	4	5	4	1	2	1	3	1	32
Cervix	0	0	0	0	0	5	6	6	5	4	2	7	6	2	0	0	2	0	45
Ovary	0	0	2	2	1	2	4	1	3	5	4	4	9	0	2	2	3	0	44
Prostate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Testis, Genital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bladder	2	0	0	0	0	1	2	0	1	1	1	0	0	0	1	0	0	1	10
Kidney, Urinary	3	0	0	0	0	0	1	2	1	1	2	0	2	0	0	0	0	0	12
Eye	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0		4
Brain, CNS	10	9	6	2	4	2	1	2	1	3	3	1	2	2	1	0	0	0	49
Thyroid	0	0	1	4	8	16	19	11	10	5	5	6	4	3	1	1	0	0	94
Other Endocrine	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
NHL - Lymph Nodes	2	0	2	0	2	1	2	2	1	2	1	2	0	0	3	1	2	0	23
NHL - Extra-nodal	1	0	2	0	2	2	0	1	2	1	1	3	5	3	5	3	1	0	32
Hodgkin's Disease-LNs	1	6	2	8	2	3	4	0	1	0	1	2	1	0	0	0	0	0	31
HD - Extra-nodal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Unknown	0	0	0	0	0	0	1	0	1	3	1	2	3	1	1	0	1	1	15
All Other Sites	1	0	0	1	1	0	0	0	0	1	0	2	0	0	2	0	0	0	8
TOTAL	43	29	26	39	36	60	78	89	91	78	64	73	76	45	41	18	22	9	917

* Includes Multiple Primary Neoplasms.

TRENDS IN RELATIVE FREQUENCY OF CANCER AT KFSH&RC (cont'd)

The relative frequencies of primary cancers seen at KFSH&RC are very different from the Western world. Common tumors of the West (lung, colon, and prostate) are much less frequent here while soft tissue sarcoma, among others, is more common. The following 1995 analytic cases exhibit significant differences in trends from those of the West when compared to the data published in *Cancer Facts & Figures - 1995*, by the American Cancer Society:

Breast - The most common malignancy seen at KFSH&RC is breast cancer, comprising 10.9% of all cases, as compared to about 15% of all neoplasms diagnosed in the U.S.A. It affects mostly women less than the age of 50, while in the U.S.A., those more than 50 years of age are mostly affected. As in the Western countries, it is the number one cancer among women.

Leukemia - Leukemia constitutes 8.7% of all cases seen at KFSH&RC, as compared to about 2% of all neoplasms diagnosed in the U.S.A. The male/female ratio is 1.4:1. It is the most common type of malignancy seen in males and the third most common in females. It is also the most common malignancy among pediatrics.

Non-Hodgkin's Lymphoma - The most striking feature is the unusually high crude relative frequency of non-Hodgkin's lymphoma, accounting for 7.5% of all cases. The male/female ratio is 1.5:1. In the U.S.A., NHL accounts for only about 4% of all cancer.

Thyroid - 2.8% of all male malignancies in KFSH&RC are thyroid tumors. However, they represent 10.3% of female malignant neoplasms, second to breast cancer. The male/female ratio is 0.3:1. Thyroid cancer accounts for only 1% of all cases in the U.S.A. and 1.9% of female malignancies.

Brain/CNS - Primary malignant neoplasm of the brain and CNS accounts for 6.1% of all malignancies and ranks second among the most common pediatric malignancies. The male/female ratio is 1.3:1. This is comparatively higher than in the West with only 1.4% of all cases.

Oral Cavity - A high crude relative frequency rate was also noted in cancer of the oral cavity. In Western countries, oral cancer accounts for no more than 3% of all cancers, whereas at KFSH&RC it represents 5.6% of the cases. The male/female ratio here is 1:1, and 2.0:1 in the West.

Lungs - Frequency of lung cancer is much lower than in Western countries, most likely reflecting the much lower levels of smoking and industrial pollution. In the U.S.A., primary lung cancer represents 13.6% of all cancer cases (14.2% in males, and 12.9% in females). At KFSH&RC, 4.4% of the diagnoses are lung cancer, although in males it is the third most common tumor, constituting 7.2% of male malignancies and 1.6% in females. The male/female ratio here is 4.3:1, in the West, 1.3:1.

Colo-Rectal - Markedly less common than in the West, for which dietary factors (particularly lower animal fat intake) may play a role, this disease represents only 3.8% of all tumors. In the U.S.A. it constitutes 11% of newly diagnosed cancer cases. The male/female ratio at KFSH&RC is 1.2:1.

Esophagus - The incidence of esophageal carcinoma is comparatively more frequent at KFSH&RC than in Western countries. In the U.S.A. it constitutes 1% of all cancers, compared to 2.3% at KFSH&RC. The male/female ratio here is 1.1:1, in the West, 2.7:1.

Liver - The relative frequency of liver cancer at the KFSH&RC (4.3%) is higher than that of the West (1.5%). The male/female ratio (2.9:1) is also significantly higher than in the West (1.1:1).

Nasopharynx - A higher crude relative frequency rate is seen in nasopharyngeal cancer. It constitutes less than 1% of the pathologically diagnosed cancers in most centers in the West, but is 3.1% of the cases at KFSH&RC. The male/female ratio at KFSH&RC is 1.8:1.

Soft Tissue - KFSH&RC cases show a higher rate of soft tissue malignancies than the U.S.A., with 3.9% against the latter's 0.5% of all cases. The male/female ratio here is 1.3:1.

Prostate - The observed rate of prostatic cancer in men is much lower than in the West, where it is one of the most common male cancers (constituting 36% of the male malignancies). This is in contrast to the KFSH&RC experience, where prostatic cancer makes up only 2.7% of the male cancer. This is probably due to the population age difference. Prostate cancer is a disease chiefly of old men and the population of Saudi Arabia is, in general, very young.

FIGURE 10

DISTRIBUTION OF 20 MOST COMMON MALIGNANCIES
1995 ANALYTIC CASES (TOTAL CASES = 1,815)

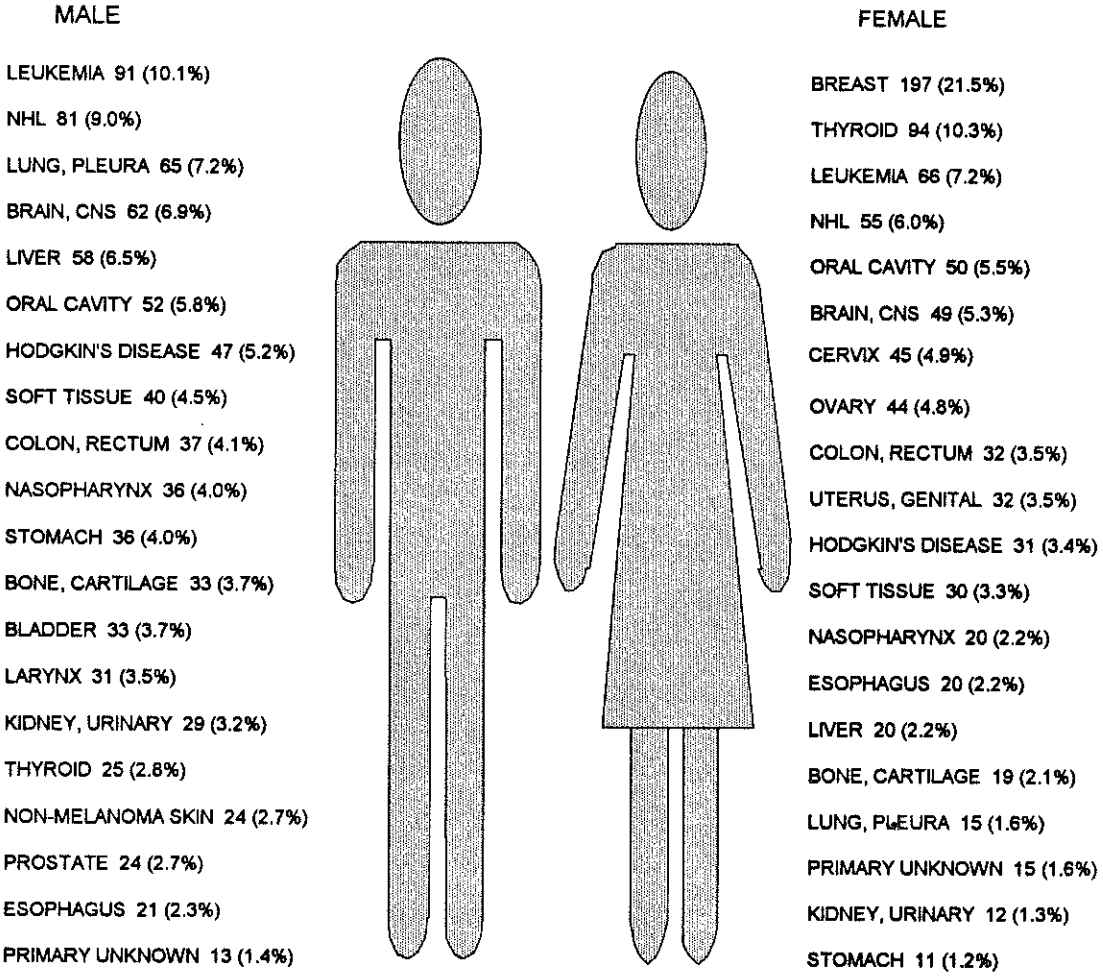
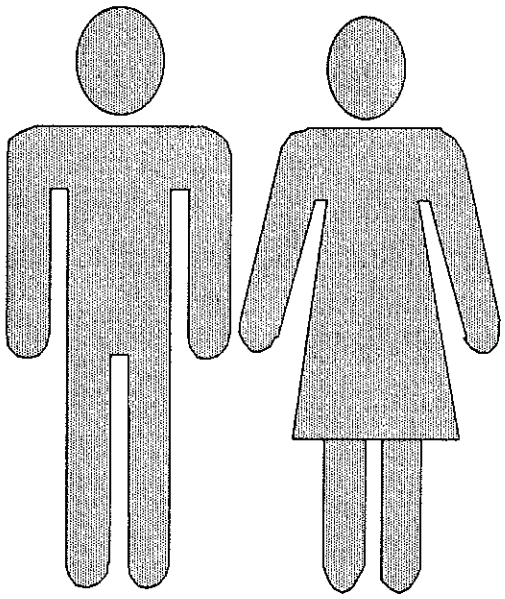


FIGURE 11

DISTRIBUTION OF PEDIATRIC MALIGNANCIES
1995 ANALYTIC CASES (TOTAL CASES = 244)



MALE

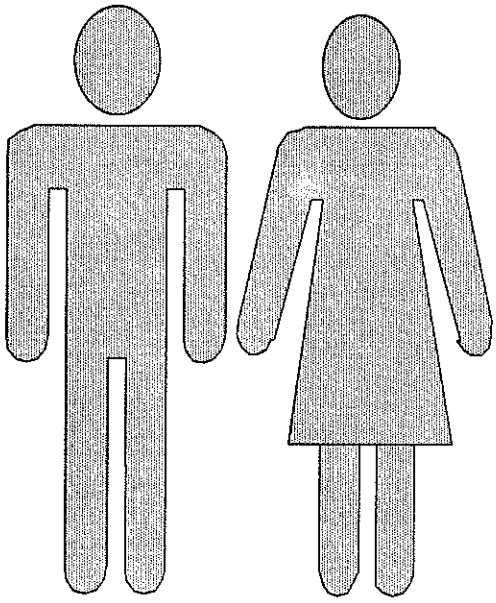
LEUKEMIA 47 (32.2%)
BRAIN, CNS 28 (19.2%)
SOFT TISSUE 13 (8.9%)
HODGKIN'S DISEASE 13 (8.9%)
NHL 11 (7.5%)
BONE, CARTILAGE 10 (6.8%)
KIDNEY 8 (5.5%)
EYE 4 (2.7%)
NASOPHARYNX 3 (2.1%)
ENDOCRINE 3 (2.1%) (Other Than Thyroid)
TESTIS 2 (1.4%)
ORAL CAVITY 1 (0.7%)
OTHER G.I. 1 (0.7%)
THYROID 1 (0.7%)
NON-MELANOMA SKIN 1 (0.7%)

FEMALE

LEUKEMIA 25 (25.5%)
BRAIN, CNS 25 (25.5%)
BONE, CARTILAGE 10 (10.2%)
HODGKIN'S DISEASE 9 (9.2%)
SOFT TISSUE 8 (8.2%)
NHL 7 (7.2%)
KIDNEY 3 (3.1%)
EYE 3 (3.1%)
OVARY 2 (2.0%)
BLADDER 2 (2.0%)
NASOPHARYNX 1 (1.0%)
THYROID 1 (1.0%)
ENDOCRINE 1 (1.0%) (Other Than Thyroid)
OTHER SITE 1 (1.0%)

FIGURE 12

DISTRIBUTION OF 10 MOST COMMON PEDIATRIC MALIGNANCIES
BY HISTOLOGY, 1995 ANALYTIC CASES (TOTAL CASES = 244)



MALE

ALL 30 (20.5%)
AML 13 (8.9%)
HODGKIN'S DISEASE 13 (8.9%)
MEDULLOBLASTOMA 12 (8.2%)
NHL 11 (7.5%)
EWING'S SARCOMA 9 (6.2%)
RHABDOMYOSARCOMA 7 (4.8%)
ASTROCYTOMA 7 (4.8%)
NEPHROBLASTOMA 6 (4.1%)
NEUROBLASTOMA 5 (3.4%)

FEMALE

ALL 16 (16.3%)
ASTROCYTOMA 13 (13.3%)
HODGKIN'S DISEASE 9 (9.2%)
RHABDOMYOSARCOMA 7 (7.1%)
NHL 7 (7.1%)
OSTEOSARCOMA 6 (6.1%)
AML 5 (5.1%)
GLIOMA, NOS 4 (4.1%)
NEPHROBLASTOMA 3 (3.1%)
EWING'S SARCOMA 3 (3.1%)
EPENDYMOMA 3 (3.1%)
MEDULLOBLASTOMA 3 (3.1%)
NEUROBLASTOMA 3 (3.1%)
RETINOBLASTOMA 3 (3.1%)

TABLE 8

PRIMARY SITE TABLE
(INCLUDES MULTIPLE PRIMARIES)
1 9 9 5

SITE HISTOLOGY	ALL CASES	ADULTS		PEDIATRICS	
		MALE	FEMALE	MALE	FEMALE
(NOS - Not Otherwise Specified)	2,163	925	952	169	117
LIP	**4**	**3**	**1**	**0**	**0**
Squamous Cell Carcinoma					
TONGUE	**28**	**18**	**10**	**0**	**0**
Squamous Cell Carcinoma	26	16	10	0	0
Adenoid Cystic Carcinoma	1	1	0	0	0
Non-Hodgkin's Lymphoma	1	1	0	0	0
MAJOR SALIVARY GLANDS	**18**	**8**	**9**	**0**	**1**
Non-Hodgkin's Lymphoma	5	2	3	0	0
Adenoid Cystic Carcinoma	4	2	2	0	0
Mucoepidermoid Carcinoma	3	2	0	0	1
Carcinoma, NOS	3	2	1	0	0
Papillary Adenocarcinoma	1	0	1	0	0
Squamous Cell Carcinoma	1	0	1	0	0
Malignant Neoplasm, NOS	1	0	1	0	0
GUM	**26**	**10**	**16**	**0**	**0**
Squamous Cell Carcinoma	24	9	15	0	0
Carcinoma, NOS	1	0	1	0	0
Non-Hodgkin's Lymphoma	1	1	0	0	0
FLOOR OF MOUTH	**3**	**2**	**1**	**0**	**0**
Squamous Cell Carcinoma					
OTHER PARTS OF MOUTH	**23**	**9**	**13**	**1**	**0**
Squamous Cell Carcinoma	14	7	7	0	0
Verrucous Carcinoma	2	0	2	0	0
Adenocarcinoma, NOS	2	1	1	0	0
Mucoepidermoid Carcinoma	1	0	1	0	0
Pleomorphic Carcinoma	1	0	1	0	0
Melanoma	1	0	1	0	0
Non-Hodgkin's Lymphoma	1	1	0	0	0
Embryonal Rhabdomyosarcoma	1	0	0	1	0
OROPHARYNX	**14**	**11**	**2**	**1**	**0**
Non-Hodgkin's Lymphoma	9	6	2	1	0
Squamous Cell Carcinoma	4	4	0	0	0
Adenoid Cystic Carcinoma	1	1	0	0	0
NASOPHARYNX	**69**	**40**	**22**	**5**	**2**
Squamous Cell Carcinoma	31	21	9	1	0
Undifferentiated Carcinoma	14	7	6	0	1
Carcinoma, NOS	14	8	4	1	1
Non-Hodgkin's Lymphoma	7	3	2	2	0
Adenocarcinoma, NOS	1	1	0	0	0
Embryonal Rhabdomyosarcoma	1	0	0	1	0
Malignant Neoplasm, NOS	1	0	1	0	0
HYPOPHARYNX	**18**	**10**	**8**	**0**	**0**
Squamous Cell Carcinoma	17	9	8	0	0
Carcinoma, NOS	1	1	0	0	0

Primary Site Table (cont'd)

SITE	HISTOLOGY	ALL CASES	ADULTS MALE	ADULTS FEMALE	PEDIATRICS MALE	PEDIATRICS FEMALE
PHARYNX, NOS		**4**	**2**	**2**	**0**	**0**
	Squamous Cell Carcinoma					
ESOPHAGUS		**50**	**25**	**25**	**0**	**0**
	Squamous Cell Carcinoma	41	19	22	0	0
	Adenocarcinoma, NOS	5	4	1	0	0
	Carcinoma, NOS	2	0	2	0	0
	Signet Ring Cell Carcinoma	1	1	0	0	0
	Malignant Neoplasm, NOS	1	1	0	0	0
STOMACH		**80**	**55**	**25**	**0**	**0**
	Adenocarcinoma, NOS	41	35	6	0	0
	Non-Hodgkin's Lymphoma	20	9	11	0	0
	Signet Ring Cell Carcinoma	11	7	4	0	0
	Carcinoma, NOS	2	1	1	0	0
	Malignant Neoplasm, NOS	2	1	1	0	0
	Linitis Plastica	1	0	1	0	0
	Mucinous Adenocarcinoma	1	1	0	0	0
	Squamous Cell Carcinoma	1	0	1	0	0
	Neuroendocrine Carcinoma	1	1	0	0	0
SMALL INTESTINE		**12**	**5**	**7**	**0**	**0**
	Non-Hodgkin's Lymphoma	6	3	3	0	0
	Adenocarcinoma, NOS	3	1	2	0	0
	Mucinous Carcinoma	1	0	1	0	0
	Carcinoid Tumor	1	0	1	0	0
	Spindle Cell Sarcoma	1	1	0	0	0
COLON		**43**	**22**	**19**	**1**	**1**
	Adenocarcinoma, NOS	32	15	17	0	0
	Non-Hodgkin's Lymphoma	6	3	1	1	1
	Mucinous Adenocarcinoma	3	2	1	0	0
	Adenosquamous Carcinoma	1	1	0	0	0
	Carcinoma, NOS	1	1	0	0	0
RECTUM/RECTOSIGMOID JUNCTION/ANUS		**51**	**30**	**21**	**0**	**0**
	Adenocarcinoma, NOS	42	24	18	0	0
	Adenoca in Adenomatous Polyp	2	2	0	0	0
	Mucinous Adenocarcinoma	2	2	0	0	0
	Squamous Cell Carcinoma	1	1	0	0	0
	Adenocarcinoma in Villous Adenoma	1	0	1	0	0
	Mucin-Producing Adenocarcinoma	1	0	1	0	0
	Signet Ring Cell Carcinoma	1	0	1	0	0
	Malignant Neoplasm, NOS	1	1	0	0	0
LIVER/INTRAHEPATIC BILE DUCTS		**100**	**75**	**25**	**0**	**0**
	Hepatocellular Carcinoma	85	65	20	0	0
	Cholangiocarcinoma	10	6	4	0	0
	Mucinous Cystadenocarcinoma	1	1	0	0	0
	Adenocarcinoma, NOS	1	1	0	0	0
	Carcinoma, NOS	1	1	0	0	0
	Non-Hodgkin's Lymphoma	1	0	1	0	0
	Malignant Neoplasm, NOS	1	1	0	0	0
GALLBLADDER/EXTRAHEPATIC BILE DUCTS		**12**	**3**	**9**	**0**	**0**
	Adenocarcinoma, NOS					

Primary Site Table (cont'd)

SITE / HISTOLOGY	ALL CASES	ADULTS		PEDIATRICS	
		MALE	FEMALE	MALE	FEMALE
PANCREAS	**26**	**15**	**11**	**0**	**0**
Adenocarcinoma, NOS	10	6	4	0	0
Carcinoma, NOS	5	3	2	0	0
Mucinous Adenocarcinoma	3	3	0	0	0
Neuroendocrine Carcinoma	3	0	3	0	0
Malignant Neoplasm, NOS	3	2	1	0	0
Islet Cell Carcinoma	1	0	1	0	0
Non-Hodgkin's Lymphoma	1	1	0	0	0
OTHER G.I. SITES	**3**	**2**	**0**	**1**	**0**
Mucinous Adenocarcinoma	1	1	0	0	0
Adenocarcinoma, NOS	1	1	0	0	0
Endodermal Sinus Tumor	1	0	0	1	0
NASAL CAVITIES/ACCESSORY SINUSES	**15**	**3**	**10**	**0**	**2**
Rhabdomyosarcoma	6	0	4	0	2
Squamous Cell Carcinoma	4	2	2	0	0
Non-Hodgkin's Lymphoma	3	0	3	0	0
Solitary Plasmacytoma	2	1	1	0	0
LARYNX	**38**	**38**	**0**	**0**	**0**
Squamous Cell Carcinoma	34	34	0	0	0
Verrucous Carcinoma	1	1	0	0	0
Carcinoma, NOS	1	1	0	0	0
Solitary Plasmacytoma	1	1	0	0	0
Malignant Neoplasm, NOS	1	1	0	0	0
TRACHEA	**2**	**1**	**1**	**0**	**0**
Squamous Cell Carcinoma	1	0	1	0	0
Adenoid Cystic Carcinoma	1	1	0	0	0
BRONCHUS/LUNG	**89**	**72**	**17**	**0**	**0**
Adenocarcinoma, NOS	26	17	9	0	0
Squamous Cell Carcinoma	25	21	4	0	0
Small Cell Carcinoma	13	10	3	0	0
Large Cell Carcinoma	8	7	1	0	0
Carcinoma, NOS	6	6	0	0	0
Carcinoid Tumor	3	3	0	0	0
Non-Hodgkin's Lymphoma	3	3	0	0	0
Bronchio-Alveolar Adenocarcinoma	1	1	0	0	0
Papillary Adenocarcinoma	1	1	0	0	0
Undifferentiated Carcinoma	1	1	0	0	0
Solitary Plasmacytoma	1	1	0	0	0
Neuroendocrine Carcinoma	1	1	0	0	0
PLEURA	**1**	**1**	**0**	**0**	**0**
Mesothelioma					
THYMUS/MEDIASTINUM	**9**	**5**	**2**	**2**	**0**
Malignant Thymoma	5	3	2	0	0
Neuroblastoma	2	0	0	2	0
Mixed Germ Cell Tumor	1	1	0	0	0
Malignant Neoplasm, NOS	1	1	0	0	0
MULTIPLE MYELOMA	**23**	**15**	**8**	**0**	**0**

Primary Site Table (cont'd)

SITE / HISTOLOGY	ALL CASES	ADULTS		PEDIATRICS	
		MALE	FEMALE	MALE	FEMALE
BONE MARROW	**193**	**57**	**52**	**56**	**28**
Acute Lymphoid Leukemia	72	14	5	36	17
Acute Myeloid Leukemia	49	11	18	14	6
Chronic Myeloid Leukemia	41	17	20	2	2
Chronic Lymphoid Leukemia	7	6	1	0	0
Acute Promyelocytic Leukemia	7	3	3	1	0
Acute Myelomonocytic Leukemia	5	1	2	1	1
Acute Monocytic Leukemia	4	1	1	1	1
Hairy Cell Leukemia	3	2	1	0	0
Chronic Myelomonocytic Leukemia	2	1	1	0	0
Megakaryocytic Leukemia	1	0	0	1	0
Prolymphocytic Leukemia	1	1	0	0	0
Acute Leukemia, NOS	1	0	0	0	1
BONE & CARTILAGE	**58**	**27**	**10**	**11**	**10**
Osteosarcoma, NOS	21	9	4	3	5
Ewing's Sarcoma	21	9	2	7	3
Chondroblastic Osteosarcoma	3	2	0	0	1
Chordoma	3	2	1	0	0
Non-Hodgkin's Lymphoma	2	2	0	0	0
Myxoid Chondrosarcoma	2	0	2	0	0
Chondrosarcoma, NOS	2	2	0	0	0
Juxtacortical Osteosarcoma	1	1	0	0	0
Small Cell Osteosarcoma	1	0	0	1	0
Chondroblastoma	1	0	0	0	1
Malig Giant Cell Tumor of Bone	1	0	1	0	0
CONNECTIVE/SUBCUTANEOUS/SOFT TISSUE	**87**	**41**	**24**	**12**	**10**
Malignant Fibrous Histiocytoma	10	8	2	0	0
Synovial Sarcoma	7	1	6	0	0
Neuroblastoma	6	1	0	3	2
Myxoid Liposarcoma	6	3	3	0	0
Non-Hodgkin's Lymphoma	6	3	1	1	1
Extra-skeletal Ewing's Sarcoma	5	0	2	3	0
Sarcoma, NOS	4	2	2	0	0
Spindle Cell Sarcoma	4	2	2	0	0
Rhabdomyosarcoma, NOS	4	1	0	1	2
Leiomyosarcoma	4	2	2	0	0
Malignant Neurilemmoma	4	3	1	0	0
Fibrosarcoma, NOS	4	1	1	0	2
Peripheral Neuroectodermal Tumor	4	2	1	1	0
Embryonal Rhabdomyosarcoma	3	0	0	2	1
Extra-skeletal Osteosarcoma	2	1	1	0	0
Liposarcoma, NOS	2	2	0	0	0
Clear Cell Sarcoma of Tendon	2	2	0	0	0
Round Cell Tumor	2	2	0	0	0
Ganglioneuroblastoma	1	0	0	1	0
Pleomorphic Rhabdomyosarcoma	1	1	0	0	0
Endodermal Sinus Tumor	1	0	0	0	1
Myosarcoma	1	1	0	0	0
Small Cell Sarcoma	1	1	0	0	0
Malignant Paraganglioma	1	1	0	0	0
Infantile Fibrosarcoma	1	0	0	0	1
Neuroendocrine Carcinoma	1	1	0	0	0

Primary Site Table (cont'd)

SITE	HISTOLOGY	ALL CASES	ADULTS MALE	ADULTS FEMALE	PEDIATRICS MALE	PEDIATRICS FEMALE
SKIN (MELANOMA)		**6**	**2**	**4**	**0**	**0**
SKIN (NON-MELANOMA)		**54**	**38**	**15**	**1**	**0**
	Basal Cell Carcinoma	22	15	7	0	0
	Squamous Cell Carcinoma	13	8	5	0	0
	Kaposi's Sarcoma	6	4	2	0	0
	Basosquamous Carcinoma	3	3	0	0	0
	Mycosis Fungoides	2	1	1	0	0
	Non-Hodgkin's Lymphoma, Large Cell	2	2	0	0	0
	T-Cell Lymphoma	2	2	0	0	0
	Merkel Cell Carcinoma	1	1	0	0	0
	Skin Appendage Carcinoma	1	1	0	0	0
	Dermatofibrosarcoma	1	0	0	1	0
	Carcinoma In Situ	1	1	0	0	0
BREAST, FEMALE		**228**	**0**	**228**	**0**	**0**
	Duct Cell Carcinoma	173	0	173	0	0
	Comedocarcinoma	10	0	10	0	0
	Lobular Carcinoma	7	0	7	0	0
	Medullary Carcinoma	6	0	6	0	0
	Mucinous Adenocarcinoma	6	0	6	0	0
	Carcinoma, NOS	4	0	4	0	0
	Paget's Disease & Duct Cell Ca	4	0	4	0	0
	Inflammatory Carcinoma	4	0	4	0	0
	Adenocarcinoma, NOS	4	0	4	0	0
	Duct and Lobular Adenocarcinoma	3	0	3	0	0
	Malignant Neoplasm, NOS	2	0	2	0	0
	Spindle Cell Sarcoma	1	0	1	0	0
	Intraductal Papillary Adenoca w/ Inv	1	0	1	0	0
	Tubular Adenocarcinoma	1	0	1	0	0
	Carcinosarcoma	1	0	1	0	0
	Non-Hodgkin's Lymphoma	1	0	1	0	0
BREAST, MALE		**1**	**1**	**0**	**0**	**0**
	Duct Cell Carcinoma					
CERVIX UTERI		**49**	**0**	**49**	**0**	**0**
	Squamous Cell Carcinoma	38	0	38	0	0
	Adenocarcinoma, NOS	8	0	8	0	0
	Carcinoma, NOS	2	0	2	0	0
	Clear Cell Adenocarcinoma	1	0	1	0	0
PLACENTA		**7**	**0**	**7**	**0**	**0**
	Choriocarcinoma	6	0	6	0	0
	Trophoblastic Tumor	1	0	1	0	0
CORPUS UTERI		**22**	**0**	**22**	**0**	**0**
	Adenocarcinoma, NOS	11	0	11	0	0
	Leiomyosarcoma	4	0	4	0	0
	Endometrial Stromal Sarcoma	2	0	2	0	0
	Papillary Serous Carcinoma	2	0	2	0	0
	Clear Cell Adenocarcinoma	1	0	1	0	0
	Papillary Adenocarcinoma	1	0	1	0	0
	Mullerian Mixed Tumor	1	0	1	0	0

Primary Site Table (cont'd)

SITE	HISTOLOGY	ALL CASES	ADULTS MALE	ADULTS FEMALE	PEDIATRICS MALE	PEDIATRICS FEMALE
OVARY		**52**	**0**	**50**	**0**	**2**
	Papillary Serous Cystadenocarcinoma	12	0	12	0	0
	Serous Cystadenocarcinoma	5	0	5	0	0
	Papillary Serous, Borderline Malig	5	0	5	0	0
	Adenocarcinoma, NOS	4	0	4	0	0
	Carcinoma, NOS	4	0	4	0	0
	Endometrioid Carcinoma	3	0	3	0	0
	Malignant Teratoma	3	0	1	0	2
	Papillary Adenocarcinoma	3	0	3	0	0
	Dysgerminoma	2	0	2	0	0
	Undifferentiated Carcinoma	2	0	2	0	0
	Mucinous Cystadenocarcinoma	2	0	2	0	0
	Mucinous Cystadenoma, Border Malig	2	0	2	0	0
	Papillary Mucinous Cystadenoca	1	0	1	0	0
	Malignant Brenner Tumor	1	0	1	0	0
	Malignant Granulosa Cell Tumor	1	0	1	0	0
	Pap Cystadenoma, Borderline Malig	1	0	1	0	0
	Squamous Cell Carcinoma	1	0	1	0	0
OTHER FEMALE GENITAL ORGANS		**10**	**0**	**10**	**0**	**0**
	Squamous Cell Carcinoma	9	0	9	0	0
	Carcinoma, NOS	1	0	1	0	0
PROSTATE		**36**	**35**	**0**	**1**	**0**
	Adenocarcinoma, NOS	30	30	0	0	0
	Carcinoma, NOS	5	5	0	0	0
	Rhabdomyosarcoma	1	0	0	1	0
TESTIS		**14**	**11**	**0**	**3**	**0**
	Seminoma, NOS	6	6	0	0	0
	Mixed Germ Cell Tumor	3	3	0	0	0
	Endodermal Sinus Tumor	3	1	0	2	0
	Malignant Teratoma	1	0	0	1	0
	Embryonal Carcinoma	1	1	0	0	0
URINARY BLADDER		**60**	**47**	**11**	**0**	**2**
	Transitional Cell Carcinoma	28	24	4	0	0
	Papillary Transitional Cell Ca	21	19	2	0	0
	Squamous Cell Carcinoma	5	2	3	0	0
	Rhabdomyosarcoma	2	0	0	0	2
	Mucinous Adenocarcinoma	1	0	1	0	0
	Spindle Cell Sarcoma	1	0	1	0	0
	Non-Invasive Papillary Carcinoma	1	1	0	0	0
	Undifferentiated Carcinoma	1	1	0	0	0
KIDNEY/URETER		**49**	**22**	**10**	**10**	**7**
	Renal Cell Carcinoma	24	16	8	0	0
	Nephroblastoma	14	0	0	7	7
	Papillary Transitional Cell Carcinoma	3	3	0	0	0
	Clear Cell Adenocarcinoma	1	1	0	0	0
	Chromophobe Carcinoma	1	1	0	0	0
	Clear Cell Sarcoma of Kidney	1	0	0	1	0
	Adenocarcinoma, NOS	1	1	0	0	0
	Squamous Cell Carcinoma	1	0	1	0	0
	Malignant Fibrous Histiocytoma	1	0	0	1	0
	Burkitt's Lymphoma	1	0	0	1	0
	Malignant Neoplasm, NOS	1	0	1	0	0

Primary Site Table (cont'd)

SITE / HISTOLOGY	ALL CASES	ADULTS MALE	ADULTS FEMALE	PEDIATRICS MALE	PEDIATRICS FEMALE
EYE	**15**	**3**	**1**	**6**	**5**
Retinoblastoma	9	0	0	4	5
Squamous Cell Carcinoma	3	2	1	0	0
Embryonal Rhabdomyosarcoma	2	0	0	2	0
Non-Hodgkin's Lymphoma	1	1	0	0	0
BRAIN	**122**	**39**	**27**	**32**	**24**
Astrocytoma, NOS	27	10	5	4	8
Glioblastoma	25	13	9	2	1
Medulloblastoma	18	0	2	13	3
Malignant Glioma, NOS	11	3	2	2	4
Anaplastic Astrocytoma	10	5	4	0	1
Pilocytic Astrocytoma	7	0	0	4	3
Fibrillary Astrocytoma	6	2	3	1	0
Ependymoma	6	1	0	2	3
Choroid Plexus Carcinoma	3	0	0	3	0
Non-Hodgkin's Lymphoma	3	1	2	0	0
Mixed Glioma	1	1	0	0	0
Oligodendroglioma	1	1	0	0	0
Pleomorphic Xanthoastrocytoma	1	0	0	1	0
Gemistocytic Astrocytoma	1	1	0	0	0
Gliomatosis Cerebri	1	0	0	0	1
Germinoma	1	1	0	0	0
OTHER NERVOUS SYSTEM	**6**	**2**	**0**	**2**	**2**
Astrocytoma, NOS	2	0	0	0	2
Malignant Glioma, NOS	2	1	0	1	0
Pilocytic Astrocytoma	1	1	0	0	0
Glioblastoma	1	0	0	1	0
THYROID	**133**	**26**	**101**	**1**	**5**
Papillary Carcinoma, NOS	94	17	75	0	2
Papillary & Follicular Adenoca	21	5	15	0	1
Follicular Adenocarcinoma	5	0	5	0	0
Non-Hodgkin's Lymphoma	5	2	2	0	1
Anaplastic Carcinoma	5	2	3	0	0
Medullary Carcinoma	1	0	0	0	1
Leiomyosarcoma	1	0	0	1	0
Carcinoma, NOS	1	0	1	0	0
OTHER ENDOCRINE GLANDS	**8**	**2**	**1**	**4**	**1**
Neuroblastoma	4	0	0	3	1
Adrenal Cortical Carcinoma	2	1	1	0	0
Pineoblastoma	1	0	0	1	0
Carcinoma, NOS	1	1	0	0	0
LYMPH NODES, NON-HODGKIN'S LYMPHOMA (Excluding Extra-Nodal Lymphomas)	**68**	**35**	**24**	**5**	**4**
Large Cell, Diffuse	23	16	7	0	0
Non-Hodgkin's Lymphoma, NOS	7	2	5	0	0
Ki-1	6	2	2	1	1
Burkitt's	5	1	0	2	2
Small Lymphocytic	5	2	3	0	0
Immunoblastic	4	2	2	0	0
Large Cell, Follicular	4	4	0	0	0
Lymphoblastic	3	1	0	2	0
Mixed Small Cleaved & Large Cell,Foll	3	3	0	0	0
Small Cleaved, Follicular	2	1	1	0	0
True Histiocytic	2	0	1	0	1

Primary Site Table (cont'd)

SITE	HISTOLOGY	ALL CASES	ADULTS		PEDIATRICS	
			MALE	FEMALE	MALE	FEMALE
LYMPH NODES, NON-HODGKIN'S LYMPHOMA (cont'd)						
	Follicular, NOS	1	0	1	0	0
	Angiocentric T-Cell	1	0	1	0	0
	Angioimmunoblastic T-Cell	1	0	1	0	0
	T-Cell Rich B-Cell	1	1	0	0	0
LYMPH NODES, HODGKIN'S DISEASE		**88**	**39**	**24**	**14**	**11**
	Nodular Sclerosis	55	25	14	11	5
	Mixed Cellularity	17	9	4	1	3
	Hodgkin's Disease, NOS	11	4	3	1	3
	Lymphocytic Predominance	5	1	3	1	0
PRIMARY UNKNOWN		**36**	**18**	**18**	**0**	**0**
	Adenocarcinoma, NOS	18	8	10	0	0
	Carcinoma, NOS	6	3	3	0	0
	Malignant Neoplasm, NOS	5	3	2	0	0
	Squamous Cell Carcinoma	3	2	1	0	0
	Neuroendocrine Carcinoma	2	1	1	0	0
	Mucinous Adenocarcinoma	1	0	1	0	0
	Signet Ring Cell Carcinoma	1	1	0	0	0

TABLE 9

PATIENTS WITH MULTIPLE PRIMARIES
1 9 9 5

PRIMARY SITE 1995	HISTOLOGY	OTHER PRIMARIES (PREVIOUS OR CONCURRENT)	ALL CASES	MALE	FEMALE
(NOS - Not Otherwise Specified)			48	19	29
ORAL CAVITY			1	0	1
Sq Cell Ca - Tongue		Breast - Duct Cell Ca			
ESOPHAGUS			1	0	1
Sq Cell Carcinoma*		Cervix - Sq Cell Ca Chr Lymphoid Leukemia			
STOMACH			2	1	1
Adenocarcinoma		Conjunctiva - Sq Cell Ca	1	1	0
NHL		Chr Myelomonocytic Leukemia	1	0	1
SMALL INTESTINE			1	0	1
Carcinoid Tumor		Skin - Kaposi's Sarcoma			
COLON			4	3	1
Adenoca-Sigmoid Colon		Bladder-Pap Trans Cell Ca	1	1	0
Adenoca-Ascend Colon		Rectum - Adenoca	1	0	1
Adenoca-Transverse Colon		Cecum/Ascend Junct-Adenoca	1	1	0
NHL - Sigmoid Colon		Bladder - Undiff Ca	1	1	0
RECTOSIGMOID			2	1	1
Adenocarcinoma		Larynx - Sq Cell Ca	1	1	0
Adenocarcinoma		Ascend Colon - Adenoca	1	0	1
LIVER			2	2	0
Hepatocellular Ca		Conjunctiva - Sq Cell Ca	1	1	0
Hepatocellular Ca		Prostate - Adenoca	1	1	0
BONE MARROW			2	1	1
Acute Myeloid Leukemia		Breast - Duct Cell Ca	1	0	1
Acute Lymphoid Leukemia		Brain - Glioblastoma	1	1	0
BONE			1	0	1
Osteosarcoma - Lt Tibia		Lt Femur - NHL			
SOFT TISSUE			2	1	1
Malig Fibr Histiocytoma		Lung - Sq Cell Ca	1	1	0
Malig Neurilemmoma		Acute Lymphoid Leukemia	1	0	1
SKIN			7	4	3
Basal Cell Carcinoma		Skin - Sq Cell Ca	2	1	1
Basal Cell Carcinoma		Conjunctiva - Sq Cell Ca	1	0	1
Squamous Cell Carcinoma		Rectum - Mucinous Adenoca	1	1	0
Squamous Cell carcinoma		Rectum - Malig Neoplasm	1	1	0
Malig Melanoma		Gum - Sq Cell Ca	1	0	1
Merkel Cell Carcinoma		Skin - T-Cell Lymphoma	1	1	0

Multiple Primaries (cont'd)

PRIMARY SITE 1995	HISTOLOGY	OTHER PRIMARIES (PREVIOUS OR CONCURRENT)	ALL CASES	MALE	FEMALE
BREAST			**8**	**0**	**8**
	Duct Cell Carcinoma	Contralateral Breast	4	0	4
	Lobular Carcinoma	Contralateral Breast	1	0	1
	NHL	Skin - Mycosis Fungoides	1	0	1
	Malignant Neoplasm	Bladder - Trans Cell Ca	1	0	1
	Malignant Neoplasm	Thyroid - Pap & Foll Ca	1	0	1
CERVIX			**1**	**0**	**1**
	Squamous Cell Ca	Vagina - Sq Cell Ca			
OVARY			**1**	**0**	**1**
	Adenocarcinoma	Breast - Duct Cell Ca			
KIDNEY			**2**	**1**	**1**
	Sq Cell Ca in Situ	Cervix - Sq Cell Ca	1	0	1
	Pap Transitional Cell Ca	Bladder-Pap Trans Cell Ca	1	1	0
URETER			**1**	**1**	**0**
	Pap Transitional Cell Ca	Bladder-Pap Trans Cell Ca			
BRAIN			**2**	**1**	**1**
	Glioblastoma	Thyroid - Papillary Ca	1	0	1
	Glioblastoma	LNs - NHL	1	1	0
THYROID			**4**	**0**	**4**
	Papillary Carcinoma	Breast - Duct Cell Ca	2	0	2
	Papillary Carcinoma	Maxilla - Osteosarcoma	1	0	1
	Papillary & Follicular Ca	Tongue - Sq Cell Ca	1	0	1
LYMPH NODES			**4**	**3**	**1**
	Ki-1 Lymphoma	Hodgkin's Disease	1	0	1
	Ki-1 Lymphoma	Mycosis Fungoides	1	1	0
	Immunoblastic Lymphoma	Abd'l Wall - Ca In Situ	1	1	0
	Hodgkin's Lymphoma	Thyroid - Papillary Ca	1	1	0

*** Patient has three primary malignancies.**

STAGE OF DISEASE AT DIAGNOSIS

Stage in any malignant process may be defined as the particular step, phase, or extent in a tumor's development which is one of the predictors for outcome and treatment selection assigned at the time of initial diagnosis. The microscopic appearance, extent, and biological behavior of a tumor as well as host factors play a part in prognosis and are therefore important in staging.

The SEER (Surveillance, Epidemiology, and End Results) Summary Staging Guide was utilized for all stageable cases. This system summarizes the disease categories into four general staging groups (i.e. in situ, localized, regional, and distant). Stage categories are based on a combination of clinical observations and operative-pathological evaluation.

Summary Staging Definitions:

IN SITU: Intraepithelial, noninvasive, noninfiltrating

LOCALIZED: Within organ

a. Invasive cancer confined to the organ of origin
b. Intraluminal extension where specified

REGIONAL: Beyond the organ of origin

a. By direct extension to adjacent organs/tissues
b. To regional lymph nodes
c. Both (a) and (b)

DISTANT: Direct extension or metastasis

a. Direct continuity to organs other than above
b. Discontinuous metastasis
c. To distant lymph nodes

Systemic diseases, i.e., leukemia and multiple myeloma and cases of unknown primary were disregarded in graphically illustrating the stages for all analytic cases seen at KFSH&RC in 1995 (Figure 13). The 34 cases unstageable at diagnosis were those patients who refused further diagnostic workup or further workup was not possible due to the patients' state of health; e.g. terminal cases or those with co-morbid conditions. Please refer also to Table 4 for the distribution of the 1995 analytic cases by site and stage at diagnosis.

In addition to the SEER Summary Staging, the cases were also staged according to the American Joint Committee on Cancer (AJCC) TNM system, a scheme based on the premise that cancers of similar histology or site of origin share similar patterns of growth and extension. This system is based on the assessment of three components:

T: Extent of the primary tumor

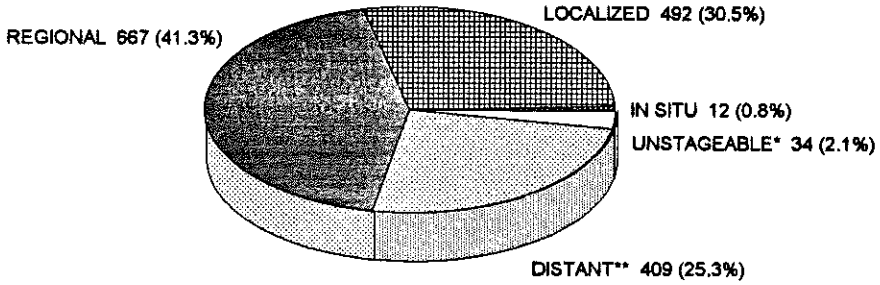
N: Absence or presence and extent of regional lymph node involvement

M: Absence or presence of distant metastasis

Analytic cases of three major sites, i.e., breast, lung and nasopharynx, are presented in Table 10 with their clinical group stage and yearly comparative figures from 1991 to 1995.

FIGURE 13

DISTRIBUTION OF ANALYTIC CASES BY STAGE AT DIAGNOSIS - 1995 (TOTAL CASES = 1,614)



*Excludes Unknown Primaries (28 cases)
**Excludes Leukemia and Multiple Myeloma (173 cases)

FIGURE 14

DISTRIBUTION OF ANALYTIC CASES BY FIRST COURSE OF TREATMENT (SINGLY OR IN COMBINATION) 1995 (TOTAL CASES = 1,815)

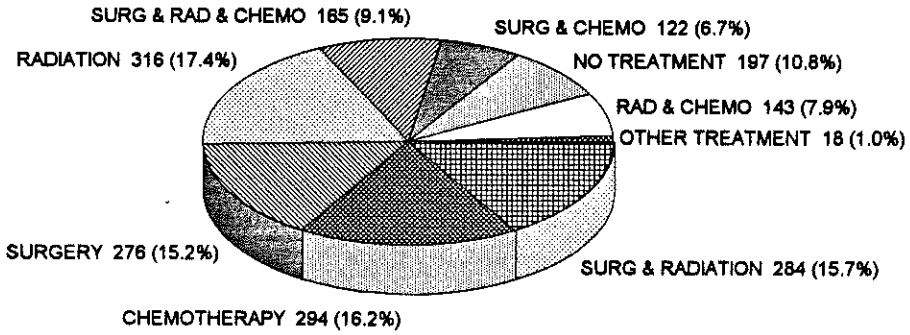


TABLE 10

CLINICAL TNM STAGE OF ANALYTIC CASES OF THREE MAJOR SITES* BY YEAR
1991 - 1995

BREAST

Stage	1991		1992		1993		1994		1995		TOTAL	
	No	%	No	%	No	%	No	%	No	%	No	%
0	0	0.0	0	0.0	2	1.0	0	0.0	2	1.0	4	0.4
1	7	5.2	4	2.8	18	8.5	9	4.6	11	5.6	49	5.6
2A	18	13.3	21	14.7	29	13.8	44	22.6	39	19.8	151	17.1
2B	28	20.7	33	23.1	46	21.8	41	21.0	37	18.8	185	21.0
3A	25	18.5	21	14.7	26	12.3	14	7.2	19	9.7	105	11.9
3B	22	16.3	33	23.1	37	17.5	31	15.9	29	14.7	152	17.3
4	26	19.3	22	15.3	41	19.4	27	13.8	31	15.7	147	16.7
Unstageable	9	6.7	9	6.3	12	5.7	29	14.9	29	14.7	88	10.0
Total	135	100.0	143	100.0	211	100.0	195	100.0	197	100.0	881	100.0

LUNG

Stage	1991		1992		1993		1994		1995		TOTAL	
	No	%	No	%	No	%	No	%	No	%	No	%
1	7	10.6	5	7.3	3	4.5	13	16.7	8	10.1	36	10.0
2	2	3.0	1	1.5	2	3.0	4	5.1	2	2.5	11	3.1
3A	6	9.1	13	19.1	6	9.0	4	5.1	9	11.4	38	10.6
3B	12	18.2	11	16.2	23	34.3	25	32.1	22	27.9	93	26.0
4	34	51.5	35	51.5	24	35.8	17	21.8	28	35.4	138	38.6
Unstageable	5	7.6	3	4.4	9	13.4	15	19.2	10	12.7	42	11.7
Total	66	100.0	68	100.0	67	100.0	78	100.0	79	100.0	358	100.0

NASOPHARYNX

Stage	1991		1992		1993		1994		1995		TOTAL	
	No	%	No	%	No	%	No	%	No	%	No	%
0	1	1.8	0	0.0	0	0.0	0	0.0	0	0.0	1	0.4
1	0	0.0	0	0.0	1	1.8	1	1.9	1	1.8	3	1.1
2	4	7.3	0	0.0	0	0.0	1	1.9	3	5.3	8	3.0
3	0	0.0	3	6.5	4	7.4	4	7.5	7	12.5	18	6.8
4	48	87.3	42	91.3	48	88.9	47	88.7	44	78.6	229	86.8
Unstageable	2	3.6	1	2.2	1	1.9	0	0.0	1	1.8	5	1.9
Total	55	100.0	46	100.0	54	100.0	53	100.0	56	100.0	264	100.0

* Excludes Lymphoma Cases

PATIENT CARE EVALUATION STUDY OF CANCER OF THE ESOPHAGUS
KING FAISAL SPECIALIST HOSPITAL AND RESEARCH CENTRE
1994

Shouki Bazarbashi MD, Dolores Michels-Harper CTR, Julia Atwood CTR

As part of quality control, which the Tumor Committee has agreed to perform, the Tumor Registry has reviewed 26 consecutive cases of cancer of the esophagus. These cases were treated at King Faisal Specialist Hospital and Research Centre during the year 1994. The results were part of a patient care evaluation study conducted by the American College of Surgeons Commission on Cancer. The objectives were to compare results at our institution with world wide results in order to improve on patient care.

Cancer of the esophagus continues to have a poor prognosis despite recent advances in surgical techniques, radiation therapy and chemotherapy. Surgery remains the treatment of choice for patients with clinically resectable tumors, with the 5-year survival rate approaching 20%. Patients who refuse surgery or are not surgical candidates for any reason, are usually treated with radical radiation therapy. The results of which are slightly inferior to that of surgery, as the 5-year survival rate with radiation therapy alone is about 10%. However, more data now support the use of combined concomitant chemoradiotherapy for patients who are not surgical candidates.

All 26 cases reviewed were diagnosed at outside facilities and referred to King Faisal Hospital for management. There were 12 males and 14 females with a ratio of 1M/:1.2F. All patients were Saudi nationals, 6 patients had family history of cancer, none of which were familial. One patient had concurrent Multiple Myeloma. History of tobacco use was asked in 7/26 cases, with only 2 being tobacco users (pipe). History of alcohol use was asked in only 3 patients, with none using alcohol.

Presenting symptoms:

Cervical Adenopathy	2
Chronic Cough	1
Dysphagia	25
Gastroesophageal reflux	3
Hematemesis	2
Hemoptysis	0
Hoarseness	1
Odynophagia	3
Shortness of Breath	1
Weight loss	15
Others*	4

*2 patients had back pain
1 patient had retrosternal pain
1 patient had chest pain

Interval from diagnosis to initiation of treatment:

range	5-111 days
median	38 days
average	47 days

Diagnostic work up results:

Test	Not Done	Abnormal due to CA	Abnormal not due to CA	Normal
Albumin	1	0	14	11
Alk Phos	1	1	8	16
Barium Esophagogram	2	24	0	0
Bone Scan	12	1	8	5
Bronchoscopy	24	0	0	2
CEA	24	0	0	2
Chest X ray	1	3	10	12
CT primary	7	19	0	0
CT chest	9	1	6	10
CT abdomen	8	9	1	8
Esophagoscopy	0	26	0	0
Mediastinoscopy	26	0	0	0
MRI primary site	26	0	0	0
MRI other site	26	0	0	0
Pulmonary function	24	0	0	2
SGOT	2	0	4	20
Tracheoscopy	24	0	0	2

Histology: All 26 cases were confirmed histologically at our institution

Squamous cell carcinoma	24
Undifferentiated carcinoma	2

No case of Barrett's esophagus was identified

Tumor Grade:

Grade II	15
Grade III	9
Unknown	2

Location:

Cervical esophagus	8
Thoracic esophagus	9
Abdominal esophagus	5
Crossed anatomic boundaries	4

Tumor Size: 24 cases (2 cases had no measurements reported in the chart)

Mean	62 mm
Range	30-120 mm
Median	60 mm

Research enrollment: 1/26

Nutritional support:

None	9
Parenteral	1
Enteral	9
Other types	7

Definitive therapy:

Radical surgery	4
Radical surgery + radiation therapy	1
Radiation therapy	21
+ Bypass surgery	1
+ Chemotherapy	4

Surgical approach:

Transhiatal	3
Thoracoabdominal	2

Gross surgical margins: Proximal 0-2 cm
Distal 0-2 cm (one patient not stated)

Microscopic margins: All free

Lymph node status: 1/5 positive

Post operative complications:

Wound infection	2
Urinary tract infection	1
Death	0

Radiation therapy total dose: 600-5000 cGy

UICC/AJCC clinical stage:

Stage I	1
Stage II	7
Stage III	8
Stage IV	5
Unknown	5

UICC/AJCC pathological stage: (5 patients)

Stage IIA	3
Stage IIB	1
Stage III	1

Clinical staging done by:

Tumor registrar	77%
Physician	23%

Pathological Staging done by: Tumor registrar 100%

Survival: at the time of this study (18/7/95)
4 patients were disease free without recurrence
2 developed recurrence (bone/liver)
clinical stage IIA/pIIB, recurred at 8 months, expired
clinical stage III, treated w/ chemoradiotherapy, recurred at 5 months
20 were never disease free, 4 of which had expired

BONE MARROW TRANSPLANTATION IN CHILDREN: KING FAISAL SPECIALIST HOSPITAL AND RESEARCH CENTRE EXPERIENCE

Hassan El Solh, MD FRCP(C) FAAP
Abdallah Al-Nasser, MD
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ABSTRACT:

The results of the activity of the Pediatric Bone Marrow Transplant Program at King Faisal Specialist Hospital and Research Centre (KFSH&RC) from June 1993 to October 1995 were reviewed. A preliminary report on the outcome of children undergoing bone marrow transplantation (BMT) particularly in relation to transplant related mortality and morbidity is presented. A total of 64 transplants were performed in 60 patients during this period of time. There were 28 patients with acute leukemia, 5 chronic myeloid leukemia (CML), 1 myelodysplastic syndrome (MDS), 10 severe combined immune deficiency (SCID), 1 combined immune deficiency (CID), 2 Wiskott-Aldrich syndrome (WAS), 1 partial albinism with immune deficiency (PAID), 4 Fanconi's anemia, 3 acquired severe aplastic anemia (SAA), 1 pure red cell aplasia (Diamond- Blackfan syndrome), 1 osteopetrosis, 1 thalassemia, 1 paroxysmal nocturnal hemoglobinuria (PNH), and 1 hemophagocytic lymphohistiocytosis (HLH). The average stay for hospitalization was 6 weeks per patient. Forty three patients (72%) are alive and disease free with a median follow up of 14 months (range 1-27 months). Nine patients died from transplant related toxicity within 100 days from BMT (Table 6). One patient died from chronic graft versus host disease (GVHD) of the liver. Eight patients with acute leukemia relapsed within one year from BMT. Further details regarding the preparative regimens, toxicity of BMT, GVHD and disease free survival are reviewed in this report.

INTRODUCTION:

Bone marrow transplantation has been frequently applied as the therapy for different malignancies in children, including primary immune deficiency diseases and hematologic disorders[1]. The BMT Program at KFSH&RC commenced in 1984 utilizing a 10 bed BMT unit. Transplants were performed on both adult and pediatric patients in the same unit till June 1993 when the Pediatric BMT Unit became separate geographically and administratively. Between 1984 and 1993 there were 329 pediatric and adult allogeneic transplants and 80 autografts (56 bone marrow and 24 peripheral blood stem cell).

In June 1993, the Pediatric BMT Program re-evaluated the eligibility criteria and priority for BMT. Pediatric BMT initially utilized two of the existing rooms that were equipped with high energy particulate air (HEPA) filters and modified reverse isolation procedures. The number of rooms was increased to four in January 1994. Table 1 shows the eligibility criteria established for the BMT Program at KFSH&RC. The objective of this report is to evaluate the activity and outcome of the Pediatric Allogeneic BMT Program. Keeping in mind that the duration of follow up is short, some valuable observations and conclusions can be made, particularly in relation to the feasibility of such a program, the selection of patients for BMT, and transplant related mortality and morbidity.

PATIENTS AND METHODS:

Between June 1993 and October 1995, 60 pediatric patients underwent allogeneic BMT at KFSH&RC. The age range was 1 month - 15 years with a median of 6 years. There were 44 males and 16 females. Table 2 and 3 show distribution of cases of malignant disorders and non-malignant disorders according to disease categories. Fifty seven patients received bone marrow from full HLA matched donors, 2 patients from 1 antigen mismatch related donors and one patient from haploidentical parent. Table 4 shows the preparative regimens used in conditioning of these patients for BMT. In general we have used cyclophosphamide

(Cy: 60 mg/k/day for two days) and fractionated total body radiation (TBI: total dose 1200 rads given in 6 fractions over 3 days) for patients with acute lymphoblastic leukemia (ALL). Busulfan (Bu: 16 mg/k) and Cy (200 mg/k) were utilized for acute non-lymphoblastic leukemia (ANLL), CML (both adult and juvenile type) and MDS. Also this regimen was used for patients with WAS and PAID. Patients with SCID received no preparative regimen or Cy (200 mg/k) depending on the absence or presence of natural killer cells as determined by immunophenotyping done on peripheral blood. One patient with CID received Bu and Cy in addition to antithymocyte globulin (ATG) at a total dose of 90 mg/k given over 3 days. Patients with Fanconi's anemia received Cy (20 mg/k) ATG (90 mg/k) and thoracoabdominal radiation (TAI: 400 cGy). Patients with acquired SAA received Cy (200 mg/k) in addition to ATG (90 mg/k) since they were heavily transfused with blood products prior to BMT. One patient with β-Thalassemia major had a second BMT that was performed about 5 years after the first one received Cy (200 mg/k) and TBI (1200 cGy). This patient had rejection after the first transplant and developed multiple antibodies against red blood cells making it extremely difficult to provide him with compatible blood transfusion on regular basis. One patient with PNH had severe course of the disease with several episodes of hemolysis and abdominal pain requiring frequent hospitalization and ultimately had antibodies against red blood cells putting her in life threatening situations due to lack of availability of compatible blood transfusions. This patient received Cy (200 mg/k) and Bu (16 mg/k) in addition to ATG (90 mg/k). The patient with HLH received Bu and Cy as preparative regimen. One patient with ALL received etoposide (VP16) at a dose of 60 mg/k and TBI (1200 rads). Also a similar regimen was given to a patient with CML who relapsed one year post BMT. Graft versus host disease prophylaxis was given to all patients. The standard regimen used at KFSH&RC is the combination of cyclosporin and short course of methotrexate. Patients who are < 1 year of age or have SCID received cyclosporin only. Patients with positive serology for cytomegalovirus (CMV) received prophylaxis with acyclovir (500 mg/m^2 q8 hr). Patients with negative serology for CMV who received bone marrow from CMV negative donors were given CMV titer negative blood products. Patients with positive serology for herpes simplex virus (HSV) received acyclovir (250 mg/m^2 q8 hr). All patients received intravenous immunoglobulin (IVIG) at a dose of 500 mg/k once weekly till day 90 post transplant for prophylaxis of infection and GVHD. Trimethoprim sulfamethoxazole was used for pneumocystis carinii prophylaxis pre-BMT and was held from day -2 till evidence of engraftment (absolute neutrophil count $\geq$ 500). All patients received irradiated blood products. On average the target number of nucleated cell count for each patient was 3 x 10^8/k. In this group of patients the range of nucleated cell count was 2.5 - 6.5 x 10^8/k with a median of 3.5 x 10^8/k.

RESULTS:

Transplant related mortality: Nine of 60 patients died within 100 days from BMT. One patient with ALL died secondary to respiratory failure due to severe idiopathic pneumonitis suspected to be related to TBI. Another patient with ALL died from liver failure secondary to a combination of GVHD and reactivation of hepatitis C infection. One patient with Fanconi's anemia died after severe intracranial hemorrhage. One patient with acquired SAA failed to engraft and ultimately died from severe venoocclusive disease after the second transplant. One patient with thalassemia died from pulmonary bleeding after the second transplant. Two patients with SCID died from pulmonary complications: the first one had respiratory syncytial virus (RSV) pneumonia and required assisted ventilation and the other one had CMV pneumonia. One patient with CID had acute renal failure followed by multiorgan failure and death. One patient with ANLL died from chronic GVHD of the liver few months after the transplant.

Relapse: Five patients with ANLL, one patient of ALL, one patient with MDS, and one patient with juvenile CML relapsed within 2 to 6 months from BMT. One patient with adult CML relapsed almost 1 year from first BMT and was salvaged by a second transplant utilizing VP16 and TBI.

Engraftment: 55 patients engrafted, 5 did not. Two patients died prior to determination of engraftment status. One patient with MDS had partial engraftment and was found to have persistent disease. Two patients did not engraft and died after second transplant (1 patient with acquired SAA who received reconditioning with Cy and TAI and a patient with thalassemia received reconditioning with ATG).

Graft versus host disease: Nineteen of 55 engrafted patients developed acute GVHD (Table 5). This rate of 35% is similar to what has already been described in several international studies[2]. All of these patients had involvement of the skin (16 had Grade I- II and 3 had Grade III, IV). Seven of these patients had GVHD of the liver and only 3 had gut GVHD. Of interest is that when the occurrence of GVHD was analyzed in patients with malignant disorders, only 13% (1 out of 8) of patients who had relapse developed GVHD, and 45% (12 out of 26) of patients with malignant disorders who continued to be in remission developed GVHD. This finding is consistent with others observation that GVHD provides graft versus leukemia effect which has a role in preventing relapse[3].

Sequalae post BMT: Periodic assessment of these patients did not show significant sequelae except for 1 patient who had infantile ALL and was transplanted using Bu/Cy regimen. She developed restrictive pulmonary disease however she has been very active and does not require oxygen. Also another patient had panopthalmitis of the left eye in association with pseudomonas septicaemia within two months from BMT. This patient developed loss of vision in the left eye. However, he is at the present time (2 years post BMT), healthy, active, and has normal vision in the right eye. The short duration of follow up may explain the relative lack of long term complications expected to occur in children post BMT[4].

DISCUSSION:

The disease free survival is very encouraging despite the short term follow up. Forty-three patients (72%) are alive and disease free with a median follow-up of 14 months (range 1-27 months). The following observations were made in relation to specific disease categories:

Leukemia: - One of 10 evaluable patients with ALL has relapsed. However, the duration of follow up is very short and re-evaluation is crucial as long term results become available. Five out of 15 patients with ANLL relapsed. This is significantly higher than ALL, which implies that a more effective preparative regimen for eradication of leukemia is required. One patient with adult CML relapsed almost one year after the first transplant and was salvaged using VP16 and TBI and has no evidence of disease clinically and hematologically 11 months post BMT.

Non-malignant hematological disorders: Three of 4 patients with Fanconi's anemia are alive, well and have normal bone marrow reconstitution post BMT. One patient who tolerated the preparative regimen well and had three cell line engraftment developed meningitis and pulmonary aspergillosis. He recovered but unfortunately had acute intracranial hemorrhage suspected to be secondary to trauma and died two months from BMT. These four patients underwent BMT utilizing a preparative regimen reported by Kohli-Kumar et al[5]: Cy (20 mg/k), ATG (90 mg/k) and TAI (400 cGy). Review of KFSH&RC experience for Fanconi's anemia prior to 1993 utilizing Cy (20 mg/k) and TBI (600 cGy) showed that only 5 out of 10 patients were cured with BMT[6].

Patients with acquired SAA benefit from the addition of ATG to Cy in preparation for BMT if they are heavily transfused pre BMT.

Immunologic disorders: Eight of 10 patients with SCID are alive and well and have normal constitution of immune function. Two patients who were poor candidates due to pulmonary complications with infection (1 patient had RSV and another CMV), died within 100 days from BMT. The CMV patient who received mismatch BMT from haploidentical related donor (his mother) engrafted, however

died secondary to CMV pneumonia. T-cell depletion using lectin agglutination and E-rosetting was employed in this case.

Patients with WAS (2) and PAID (1) did very well and had uneventful course during and after BMT.

Second BMT: Four patients underwent second BMT due to engraftment failure or relapse (one patient with thalassemia and another with aplastic anemia failed to engraft, one with adult CML relapsed and another with MDS had partial engraftment and persistent disease). The only patient who had a successful second BMT, was performed 1 year from the first transplant, when the patient was in the second chronic phase of his disease (adult CML).

CONCLUSION:

Results of Pediatric BMT program at KFSH&RC from June 1993 to October 1995 have been comparable to those reported in the literature as far as transplant related mortality and morbidity. The duration of follow up is short and the long term outcome is yet to be determined. One of the most important factors in improving the outcome is the selection of patients focusing on giving priority to those who have shown response to chemotherapy for patients with leukemia (in first remission for ANLL and second remission for ALL), minimal blood product transfusions pre-BMT for patients with non-malignant hematologic disorders and absence of organ dysfunction or persistent infection at the time of BMT.

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1. Johnson F, Pochedly C, eds. Bone marrow transplantation in children. New York: Raven Press 1990.

2. Ferrara JLM, Deeg HJ: Graft-versus-host-disease. N Engl. J Med. 324: 667, 1991.

3. Sullivan KM, Weiden PL, et al. Influence of acute and chronic graft-versus-host-disease on relapse and survival after BMT from HLA identical siblings as treatment of acute and chronic leukemia. Blood 73: 1720, 1989.

4. Bushhouse S, Ramsay NKC, et al. Growth in children following irradiation for bone marrow transplantation. Am J Pediatr Hematol Oncol 11: 134, 1989.

5. Kholi-Kumar M, Morris C et al. Bone marrow transplantation in Fanconi anemia using matched sibling donors. Blood 84: 2050, 1994.

6. Solh H, Rao K, et al. Bone marrow transplantation in Fanconi's Anemia: Experience with cyclophosphamide and total body irradiation conditioning regimen. Presented at the Marrow Transplantation in Children: Current Results and Controversies. March 3-5, 1994, Hilton Head Island, South Carolina, USA.

TABLE 1

ELIGIBILITY CRITERIA FOR PEDIATRIC PATIENTS FOR BMT AT KFSH&RC

A) ***ALLOGENEIC***

- Aplastic anemia
- SCID, Wiskott-Aldrich syndrome
- ANLL (CR1 and CR2)
- Myelodysplasia
- High risk ALL (CR1): infantile, t(9,22) and t(4,11)
- ALL (CR2)
- CML (1st and 2nd chronic phase, early accelerated phase and blast crisis provided there is an approved protocol)
- Fanconi's Anemia, Osteopetrosis, Thalassemia, Diamond-Blackfan (refractory to steroid therapy), congenital neutropenia (Kostmann syndrome).

B) ***AUTOLOGOUS***

- Hodgkin's disease (with no BM involvement and relapse on or off intensive chemotherapy after demonstrating chemosensitivity)
- NHL (with no BM involvement and relapse on or off intensive chemotherapy after demonstrating chemosensitivity).

TABLE 2

CHILDREN WITH MALIGNANT DISEASE TRANSPLANTED AT KFSH&RC

(JUNE 1993 - OCTOBER 1995)

ALL	13	(1 CR1, 8 CR2, 4 CR3: post first BM relapse)
ANLL	15	(14 CR1, 1 CR2)
CML	4	(4 CP1, of which 1 had a second BMT in CP2)
JCML	1	
MDS	1	
Total	**34**	

ALL: Acute lymphoblastic leukemia, ANLL: Acute nonlymphoblastic leukemia, CML: Chronic myeloid leukemia, JCML: Juvenile chronic myeloid leukemia, MDS: Myelodysplastic syndrome. CR1: first complete remission, CR2: second complete remission, CR3: third complete remission. CP1: first chronic phase, CP2: second chronic phase.

TABLE 3

CHILDREN WITH NON-MALIGNANT DISEASE TRANSPLANTED AT KFSH&RC

(JUNE 1993 - OCTOBER 1995)

SCID	10
CID	1
WAS	2
PAID	1
Fanconi's anemia	4
SAA	3
Thalassemia	1
Pure Red Cell Aplasia	1
Osteopetrosis	1
PNH	1
HLH	1
Total	**26**

SCID: Severe combined immune deficiency, CID: Combined immune deficiency, WAS: Wiskott-Aldrich syndrome, PAID: Partial albinism with immune deficiency, SAA: Severe aplastic anemia, PNH: Paroxysmal nocturnal hemoglobinuria, HLH: Hemophagocytic lymphohistiocytosis.

TABLE 4

PREPARATIVE REGIMENS USED FOR 64 PEDIATRIC BMT AT KFSH&RC

(JUNE 1993 - OCTOBER 1995)

BU/CY	26
CY/TBI	12
CY	9
CY/TAI/ATG	5
BU/CY/ATG	4
CY/ATG	3
VP16/TBI	2
ATG	1
No preparation	2
Total	**64**

CY: Cyclophosphamide, BU: Busulfan, TBI: Total body irradiation, ATG: Antithymocyte globulin, TAI: Thoracoabdominal irradiation, VP16: Etoposide.

TABLE 5

OCCURRENCE OF ACUTE GVHD IN ENGRAFTED PEDIATRIC PATIENTS WHO UNDERWENT BMT AT KFSH&RC (JUNE 1993 - OCTOBER 1995)

Total number of engrafted patients		55
Total number of patients with acute GVHD		19
Skin involvement	19/19	(G III-IV: 3)
Liver involvement	7/19	(G III-IV: 3)
Gut involvement	3/19	(G IV: 1)

TABLE 6

OUTCOME OF 60 PEDIATRIC PATIENTS WHO UNDERWENT BMT AT KFSH&RC (JUNE 1993 - OCTOBER 1995)

Malignant disorders:	
Alive disease free	23
Died due to BMT related toxicity	3
Relapsed	8
Total	**34**
Non Malignant disorders:	
Alive disease free	20
Died due to BMT related toxicity	6
Total	**26**

APPENDIX A

1995 REQUESTS FOR TUMOR REGISTRY DATA

*Publication **KFSH&RC Presentation ***Outside KFSH&RC Presentation

January	
CML Patients who Received Interferon (MR Numbers) (1993-1994)	Mr. M. Ashour
Lung Small Cell Cancer Cases (MR Numbers) (1991-1994)**	Dr. R. Wierzbicki
Retinoblastoma Cases (MR Numbers) (1993-1994)	Drs. Gray, Pradhan
Wilm's Tumor w/ Age at Dx, Sex, Laterality, Stage, Vital Status (MR Numbers) (1980-1993)	Dr. M. Mustafa
Pediatric AML w/ Age at Dx, Date of Dx, Status as of Last Contact (MR Numbers) (1992-1994)	Dr. H. Solh
Breast Cancer Cases by Age at Dx and Stage (Analytic Cases) (1987-1993)	Dr. R. Siegel
Childhood Malignancies by Histology (1975-1994)	Dr. M. Mustafa
Thyroid Cancer Cases with Other Malignancies (1978-1994)	Dr. N. Nylen
Male Breast Cancer Cases (MR Numbers) (1975-1993)	Dr. A. Ezzat
Adult Acute Leukemia Cases (MR Numbers) (1975-1994)	Dr. M. Ellis
February	
Slides of 9 Graphs in the 1993 Annual Report	Dr. D. Pradhan
Nasopharyngeal Cancer Cases (MR Numbers) (1984-1995)**	Dr. R. Wierzbicki
Head & Neck Cancer Cases by Region (1975-1993 & 1991-1993)**	Dr. A. Flores
Breast Cancer Cases (MR Numbers)(1980-1991)(Update of Previous Request)	Dr. A. Ezzat
Retinoblastoma Cases w/ Treatment Modality (MR Numbers) (1975-1994)*	Dr. A. Kofide
Osteosarcoma Cases w/ Age at Dx (MR Numbers) (1980-1993) (Update of Previous Study)	Dr. R. Wierzbicki
Adult ALL Cases (MR Numbers) (1987-1994) Update of Previous Study)	Dr. H. Clink
March	
Pediatric ALL & Burkitt's Lymphoma Cases w/ Sex, Age at Dx, Date of Dx, Status as of Last Contact (MR Numbers) (1992-1994)	Dr. H. Solh
Adult Kidney Cancer Cases w/ Sex, Age at Dx, Histology (MR Numbers) (1983-1994)*	Dr. A. H. Kardar
Pediatric ALL Cases w/ Vital Status as of Last Contact (MR Numbers) (1993-1994)	Dr. A. Al Nasser
Cancer of the Mouth Cases by Region (1990-1994)**	Dr. M. Abuzeid
Pediatric Cancer Cases by Age at Dx, Sex, Nationality, Region, Site, Histology (1976-1993)*	Dr. R. Al Sudairy
April	
Malignant Cases by Site and Sex (1994)	Ministry of Health
Adult CML Cases (MR Numbers) (1994-Jan.1995)	Dr. P. Ernst
Nodal Large Cell NHL Stages 1 & 2 Cases by Sex, Age at Dx, B/A Symptoms, Treatment Modality, Relapse Info (date & site) (last 150 cases) MR Numbers)	Dr. A. Ezzat

May	
Cutaneous T-Cell Lymphoma & Mycosis Fungoides Cases w/ All Available Info (MR Numbers)(1975-present)*	Dr. A. Al Eisa
Breast Cancer Cases (MR Numbers) (1992-1994)(Update)	Dr. A. Ezzat
Retinoblastoma Cases with Age at Dx & Treatment Modality (MR Numbers) (1975-1994)	Dr. Mustafa
Cancer of the Larynx, Nasopharynx, Pharynx, Oral Cavity, & Thyroid Cases by Site and Region (1975-1993)	Dr. A. Flores
Ependymoma Cases w/ Sex, Age at Dx, Site, Date of Diagnosis (MR Numbers) (1975-present)	Dr. B. Sheikh
Oral Cavity Cancer Cases (MR Numbers) (1980-1990)	Dr. A. Flores
June	
Adult Leukemia Cases (MR Numbers) (1993-1994)	Ms. J. Dick
Head and Neck Osteosarcoma Cases (MR Numbers) (1985-1995)*	Dr. R. Wierzbicki
Adult Soft Tissue Sarcoma Cases (MR Numbers) (1989-present)*	Dr. R. Wierzbicki
Cerebellar and Brain Stem Lesions by Sex (1982-1994)*	Dr. J. Iqbal
Osteosarcoma Cases (MR Numbers) (1989-present)*	Dr. R. Wierzbicki
Nasopharyngeal Cancer Cases Treated by Chemo (MR Numbers) (1993-present)*	Dr. R. Wierzbicki
Ewing's Sarcoma Cases (MR Numbers) (1989-present)*	Dr. R. Wierzbicki
July	
Pediatric ALL and AML Cases w/ All Available Information (MR Numbers) (1993-present)	Dr. H. Sohl
Pediatric Rhabdomyosarcoma Cases w/ Sex, Age at Dx, Date of Dx, Stage, Status as of Last Contact (MR Numbers) (1985-1993)	Dr. Mustafa
Nasopharyngeal Cancer Cases by Histology and Stage (MR Numbers) (1992-1994)	Dr. A. Flores
Astrocytoma and Oligodendroglioma Grade 4 Cases Who Received Radiation Therapy (MR Numbers) (1978-1994)*	Dr. H. Schultz
August	
Multiple Myeloma Cases w/ Date of Dx (last 60 cases) MR Numbers)	Dr. F. Zwaan
Pediatric Neuroblastoma Cases w/ Sex, Date of Dx, Stage, Status as of Last Contact (MR Numbers) (1985-1993)	Dr. M. Mustafa
Hypopharyngeal and Cervical Esophageal Cancer Cases w/ Histology and Stage (MR Numbers) (1992-1994)	Dr. A. Flores
Leukemia Cases with CNS Involvement w/ Sex, Age at Dx, Histology (MR Numbers) (1989-1994)	Dr. J. Watran
Adult Soft Tissue Sarcoma Cases w/ Stage & Treatment Modality (MR Numbers) (1991-1994)	Dr. M. A. Raja
September	
Optic Glioma Cases (MR Numbers) (1975-present)*	Dr. A. Essa
Lymphoma Cases w/ Site, Histology, Stage, Metastatic Site/s if Distant (MR Numbers) (1975-present)	Dr. A. Ezzat
Hepatoma Cases w/ Class of Case (MR Numbers) (1975-present)	Dr. A. Ezzat
Multiple Primary Malignancies w/ All Available Info to be Downloaded in a Disk	Dr. A. Ezzat
Gastrointestinal Tract Lymphoma Cases w/ Sex, Age at Dx, Histology, Stage, Treatment Modality, Status as of Last Contact (MR Numbers) (1991-1994)	Dr. A Rostom

October	
Gastric Lymphoma (MR NUmbers) (1991-1995)*	Dr. E. Wiebe
Renal Lymphoma (MR Numbers) (1991-1995)*	Dr. E. Wiebe
Primitive Neuroectodermal Tumor by Supratentorial vs Infratentorial, Adults vs Pediatrics, Sex (1982-1994)*	Dr. J. Iqbal
Pediatric Aggressive Neurofibromatosis (MR Numbers) (1975-present)	Dr. M. Ayas
Pediatric Ewing's Sarcoma and PNET of Bone & Soft Tissue w/ Site and Stage (MR Numbers) (1980-1993)	Dr. I. Al Fawaz
November	
Pediatric Osteosarcoma Cases (MR Numbers) (Nov 1994-present)	Dr. M. Mustafa
Pediatric Non-Hodgkin's Lymphoma Cases (MR Numbers) (1985-1994)	Dr. M. Mustafa
December	
Pineal Gland Tumor Cases w/ Histology (MR Numbers) (1992-1994)*	Dr. S. Bazarbashi
Unknown Primary Cases w/ Sex, Age at Dx, Histology, Date of Dx, Treatment Modality (MR Numbers) (1985-1993)*	Dr. A. Rostom
Adult Hodgkin's Disease Stages 1 & 2 by Stage and Year (1993-1994)	Dr. S. Bazarbashi

APPENDIX B

1995 Tumor Committee Members

William Allard, D.M.D.	Dentistry
Hamad Al Daig	CHIC
Shouki Bazarbashi, M.D*	Medical Oncology
Peter Ernst, M.D.	Hematology Oncology
Adnan Ezzat, M.D.	Medical Oncology
Mohd Hannan, Ph.D	B&MR Research Centre
Stig Ingemansson, M.D.	Surgery
Justin Martin, M.D.**	Pathology
Peter McArthur, M.D.	Surgery
Dolores K. Michels-Harper, C.T.R.	Tumor Registry
Lamia NouNou	Social Services
Assem Rostom, M.D	Radiation Oncology
Rajeh Sabbah, M.D.***	Chairman, Oncology
Sultan Al Sedairy, Ph.D.	Research Centre
Jens O. Sieck, M.D.	Medicine
Jamal Al Subhi, M.D.	Obstetrics/Gynecology
Beth Ann Tomasek***	Quality Assurance

* Chairman
** Deputy Chairman
*** Ad hoc Members

APPENDIX C

SUMMARY OF CASES PRESENTED
TUMOR BOARD - 1995

SITE	NO.
Lymphatic System	
Non-Hodgkin's Lymphoma	5
Hodgkin's Disease	3
Leukemia	4
Bone	3
Brain	2
Breast	1
Kidney	1
Soft Tissue	1
Testis	1
Hemophagocytic Syndrome	1
Von Hippel-Lindau Syndrome	1
Autoimmune Hemolytic Anemia	1
Massive Lymphadenopathy	1
Abdominal Mass	1
Inguinal Mass	1

Tumor Board Coordinator: Dr. Shouki Bazarbashi

APPENDIX D

1995 SUMMARY OF ONCOLOGY GRAND ROUNDS TOPICS

10 Jan	Non-Hodgkin's Lymphoma in Children: Types and Treatment	Dr. K. McClain
24 Jan	BMT for Acute Leukemia: KFSH&RC Experience	Dr. F. Zwaan
14 Mar	Organ Preservation in Laryngeal Cancer	Dr. A. Flores
04 Apr	Role of Chemotherapy in Ovarian Germ Cell Tumors	Drs. Ezzat, Warith & Raja
11 Apr	Retinoblastoma, Medulloblastoma and Retinal Degeneration: New Perspectives	Dr. R. Hurwitz
25 Apr	Multiple Myeloma	Dr. E. Sahovic
23 May	High Grade Gliomas	Dr. M. Chintagumpala
27 June	The Late Effects of Childhood Cancer Therapy	Dr. Z. Dreyer
22 Aug	A Review of the Pediatric Oncology Group (POG) Experience in Treating Infants with Brain Tumors	Dr. D. Strother
12 Sept	Pediatric Non-Hodgkin's Lymphoma: NCI Experience	Dr. A. Shad
26 Sept	Hepatocellular Carcinoma (HCC). An Endemic Disease, Too Many Therapeutic Options. Do They Work?	Dr. A. Radwi
10 Oct	2nd Primary Lung Tumor: Patients with Breast Cancer	Dr. A. Rostom
	Nasopharyngeal Cancer: Strategies for the Future	Dr. A. Flores
24 Oct	Gastrointestinal Non-Hodgkin's Lymphoma	Dr. M. Al Jurf
14 Nov	Antimicrobial Prophylaxis in BMT	Dr. F. Momin
28 Nov	Update on Modern Palliative Care	Dr. D. Doyle
12 Dec	Hodgkin's Lymphoma	Dr. G. Jano

Oncology Grand Rounds Coordinator: Dr. Ferdinand Zwaan

V. GLOSSARY OF TERMS

Accessioned: Patients are entered into the Tumor Registry by the year in which they were first seen at KFSH&RC for each primary cancer.

Age of Patient: Recorded in completed years at the time of diagnosis.

Analytic Cases: Cases which were first diagnosed and/or received all or part of their first course of treatment at KFSH&RC.

Non-Analytic Cases: Cases diagnosed elsewhere and received all of their first course of treatment elsewhere.

Case: A diagnosis or finished abstract. A patient who has more than one primary is reported as multiple cases.

Crude Relative Frequency: The proportion of a given cancer in relation to all cases in a clinical or pathological series.

First Course of Treatment: The initial tumor-directed treatment or series of treatments, usually initiated within four months after diagnosis.

Stage of Disease: Determined at the time of the first course of treatment.

SEER (Surveillance, Epidemiology and End Results) Summary Staging:

In Situ: Tumor meets all microscopic criteria for malignancy except invasion.

Local: Tumor is confined to organ of origin.

Regional: Tumor has spread by direct extension to immediately adjacent organs and/or lymph nodes and appears to have spread no further.

Distant: Tumor has spread beyond immediately adjacent organs or tissues by direct extension and/or has either developed secondary or metastatic tumors, metastasized to distant lymph nodes or has been determined to be systemic in origin.

AJCC (American Joint Committee on Cancer) TNM Staging: A classification scheme based on the premise that cancers of similar histology or site or origin share similar patterns of growth and extension.

T+N+M = Stage

T: Extent of primary tumor

N: Extent of regional lymph node involvement

M: Distant Metastasis

Clinical Stage: Classification based on the evidence acquired before treatment. Such evidence arises from physical examination, imaging, endoscopy, biopsy, surgical exploration and other relevant findings.

Pathologic Stage: Classification based on the evidence acquired before treatment, supplemented or modified by the additional evidence acquired from surgery and from pathologic examination of the resected specimen.